DECEMBER 7, 1959

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

FOREIGN ROUNDUP NO. 1

Latin America

Steel production south of the border, led by Argentina, Brazil, Mexico, and Venezuela, is expected to top 5.5 million tons in 1960. But many problems have to be overcome, and output still won't match demand by 1965. See Page 91.

Big Industrial Outlays Bolster 1960's Construction Outlook

How to Upgrade Work Simplification

GE's Boulwareism: Using Marketing Techniques in Labor Relations

Loop-the-Loop Annealing Furnace Improves Copper Tube Finish

Spun Glass Challenges Metals

Gas Industry Expansion Plans Will Spur Pipeline Markets Next Year

COMPLETE CONTENTS
TURN PAGE

METALWORKING OUTLOOK
PAGE 81

B&W has taken the step...

a NEW PLANT at Beaver Falls for the manufacture of a

COMPLETE LINE OF WELDING FITTINGS AND FLANGES

Beaver Falls, Pennsylvania is the site for B&W's new Welding Fittings plant. When in operation it will be one of the most efficient sources of supply in the industry . . . one that has been designed with product quality as well as customer service in mind. Not only will it have facilities for the manufacture of a complete line of carbon, alloy and stainless steel fittings and flanges, but its location makes possible integration with B&W's other manufacturing operations . . . their steel mills and their tube mills.

This means that

(a) you can get a complete line of welding fittings and flanges

(b) you can get a complete process piping package — welding fittings, flanges *and* tubular products from one source

(c) you can more effectively control both buying and delivery from one manufacturer . . . The Babcock & Wilcox Company

An announcement of the transfer of welding fittings operations from Milwaukee to Beaver Falls will be made in the near future.

For further details ask for bulletin FDM-2016 or call on any of the local B&W District Sales Offices. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

TA-9026-G1

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

This Week in STEEL

The Metalworking Weekly

December 7, 1959 Vol. 145—No. 23

Metalworking Outlook, Page 81

The Editor's Views—Unhappy Steelworkers? 87
▶ Big Industrial Outlays Bolster 1960's Construction Outlook .. 89
▶ Latin America Gets Set for '60s—Progress begets problems .. 91
No. 1 in a series of foreign roundups on metalworking
▶ Marketing Methods Sell Labor on GE—"Boulwareism" works 94
Steel Firms Start Drive for Workers' Votes 96
New Forgings Aid Rocketry—Wyman-Gordon reports advance 97
Building Process Whittles Costs—It's Tilt-Frame construction 101
▶ How to Upgrade Work Simplification Programs 104
Copperweld Expansion to Hit $15.8 Million 121

Technical Outlook, Page 137

▶ Loop-the-Loop Installation Anneals Copper Base Tubing 138
▶ Spun Glass Challenges Metals—Aids missile and rocket makers 141
Teamwork Puts New Edge on Quality—Some tips from experts 142
Another entry in STEEL's Cost Crisis Awards competition
Progress in Steelmaking—Magnetic Coolant Cleaning Upgrades Cold Rolled Strip—Smudges and pitting are eliminated 146
Explosive Forming . . . From Blank to Cone in One Easy Step 152
Self-Indexing Brazer Boosts Tank Output—Assemblies uniform 155
Microfilm Printing Time Cut from Hours to Minutes 158
Blast Cleaning Machine Speeds Scale Removal—Product better 159

Market Outlook, Page 189

Complete Index to Market News and Prices 189
▶ Tube Demand Points Upward—Gas industry expansion is factor 191
Imported Steel Prices Holding in Southwest 193
Iron, Steel Production at Record Pace in Canada 197
Steelworks Operation Chart and District Ingot Rates 198
Scrap Retreating to Lower Level—Composite at $42.67 210
Nonferrous Metals—Copper Peace Draws Closer 214

▶ Articles listed on cover.

WHERE TO FIND

Metalworking Pulse.. Turn Page
STEEL Servicenter 5
Calendar of Meetings 10
Editorial & Business Staffs 16
Windows of Washington . 98
Mirrors of Motordom 107
The Business Trend 111
Men of Industry 115
Obituaries 118
New Products 161
New Literature 186
Advertising Index 218

Index available semiannually.

STEEL is also indexed by Engineering Index, 29 W. 39th St., New York 18, N. Y.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $20 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday and copyright 1959 by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Metalworking Pulse ▶

TURN

Metalworking Pulse

INDUSTRIAL PRODUCTION INDEX

	WEEK ENDED NOV. 28	PREVIOUS WEEK	MONTH AGO	YEAR AGO
(1947-49=100) Based on steel output, electric power output, freight carloadings, auto assemblies	157† †Preliminary.	158	115	148

For the first time in many years, STEEL's industrial production index held its own in the Thanksgiving week. Rising steel production counterbalanced holiday dips in the other components.

Details on Page 111

U. S. PASSENGER CAR PRODUCTION

	WEEK ENDED DEC. 5	PREVIOUS WEEK	MONTH AGO	YEAR AGO
Number of units assembled ..... (Source: Ward's Automotive Reports.)	60,000* *Estimated.	43,958† †Preliminary.	63,451	147,361

Auto production is still hampered by steel shortages, but producers are starting up part facilities in anticipation of new metal supplies. If the steelworkers stay on the job, first quarter production could set an all-time record.

Details on Page 108

NATIONAL STEEL INGOT PRODUCTION

	WEEK ENDED DEC. 6	PREVIOUS WEEK	MONTH AGO	YEAR AGO
Net tons (thousands)	2,619*	2,540	368	1,985
Index (1947-49=100)	163.0*	158.1	22.9	123.6
Percentage of capacity	92.5*	89.7	13.0	73.5

*Estimated by STEEL; comparative figures reported by AISI.

If mills can maintain current production rates for the balance of this year, output for the year will approximate 92.5 million tons. That would be an increase of 8.5 per cent over the 1958 total.

Details on Page 198

STEEL SCRAP PRICE COMPOSITE

	DEC. 2	WEEK AGO	MONTH AGO	YEAR AGO
Based on No. 1 heavy melting grade at Pittsburgh	$42.67	$43.50	$45.33	$39.67

No. 1 heavy melting steel scrap prices are easing due to a decline in export demand and continued absence of any large tonnage purchases by domestic mills.

Details on Page 210

FINISHED STEEL PRICE INDEX

	DEC. 1	WEEK AGO	MONTH AGO	YEAR AGO
Based on Bureau of Labor Statistics data (1947-49=100)	186.8	186.8	186.8	186.9

Suppliers of imported steel may hold prices unchanged for at least three months even if U. S. industry escapes another shutdown in January. Demand is expected to be well maintained until normal domestic deliveries are established.

Details on Page 199

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

How Heat-Treatment Affects Alloy Steels

Heat-treatment may be defined as an operation or series of operations involving the heating and cooling of steel in the solid state to develop the required properties. There are in general five different forms of heat-treatment used with alloy steel. These treatments modify the mechanical properties of the steel to suit the end use.

The five forms of treatment mentioned above, as applied to constructional alloy steels, are discussed in the following paragraphs:

(1) *Quenching and Tempering.* This form of heat-treatment usually consists of three successive operations: (a) heating the steel above the critical range, so that it approaches a uniform solid solution; (b) hardening the steel by quenching it in oil, water, brine, or salt; and (c) tempering the steel by reheating it to a point below the critical range in order to effect the proper combination of strength and ductility.

(2) *Normalizing.* A form of treatment in which the steel is heated to a predetermined temperature above the critical range, after which it is cooled to below the range in still air. The purpose of normalizing is to promote uniformity of structure and to alter mechanical properties.

(3) *Annealing.* This method consists of heating the steel to a point at or near the critical range, then cooling at a predetermined slow rate. Annealing is used to soften the steel, to improve machinability, to reduce stresses, to improve or restore ductility, and to modify other properties.

(4) *Spheroidize-Annealing.* This form of heat-treating requires prolonged heating of steel at an appropriate temperature, followed by slow cooling to produce a globular condition of the carbide. This treatment produces a structure which may be desirable for machining, cold-forming, or cold-drawing, or for the effect it will have on subsequent heat-treatment.

(5) *Stress-Relieving.* This is the process of reducing internal stresses by heating the steel to a temperature below the critical range, and holding for a time interval sufficient to equalize the temperature throughout the piece. The object of this treatment is to restore the elastic properties of the steel, or to reduce stresses that may have been induced by machining, cold-working, or welding.

Each of the five forms of heat-treatment will be the subject of a future advertisement.

Bethlehem metallurgists have had long experience in all methods of heat-treatment. They understand the possibilities and limitations of each method with respect to various alloy steels. These men will be glad to help you with any problems concerning heat-treatment. Feel free to ask for their services.

And call on Bethlehem, too, for the full range of AISI standard alloy steels, as well as special-analysis steels and all carbon grades. We can meet your needs promptly.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

When it comes to

MINERAL ACIDS

SULFURIC ACID
Standard: 60° and 66° Baumé, 99% H_2SO_4
Diamond: 66° Baumé
Reagent, ACS

NITRIC ACID
Diamond: 36°, 38°, 40°, and 42° Baumé
Strong Nitric Acid, 95% and fuming grades
Photo-Engravers' Grade
Reagent, ACS

MURIATIC (Hydrochloric) ACID
18°, 20° and 22° Baumé, Standard, Diamond, Crystal and Reagent Grades

HYDROFLUORIC ACID
Anhydrous, Aqueous 70%, and Reagent

PHOSPHORIC ACID
Wet Process, 65% and 75%, Com'l and Fertilizer Grades
Food Grade, 75%
N.F., 85%

MIXED ACID
Varying proportions of Nitric and Sulfuric Acids to meet customers' requirements

Come to

GENERAL CHEMICAL

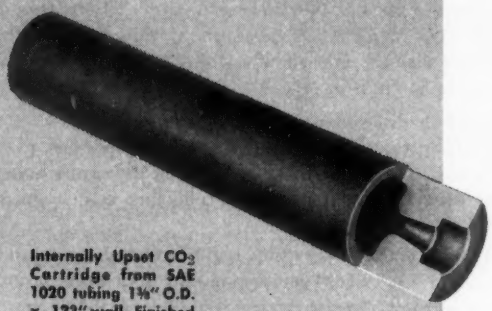
For 60 years, General Chemical has been the nation's primary producer of heavy acids. General has its own basic raw material sources. Its production facilities include 21* sulfuric plants, 4* hydrofluoric plants, 3 nitric and 3 muriatic acid plants. It operates one of the nation's largest fleets of tank cars, tank trucks and acid-carrying barges, and distributes from key points coast-to-coast. General's production, transportation, service and sales facilities are geared to meet your requirements best, both in quality of product and dependability of service. Write or phone today for information or service.

Basic to America's Progress

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

*In Canada: Allied Chemical Canada, Limited

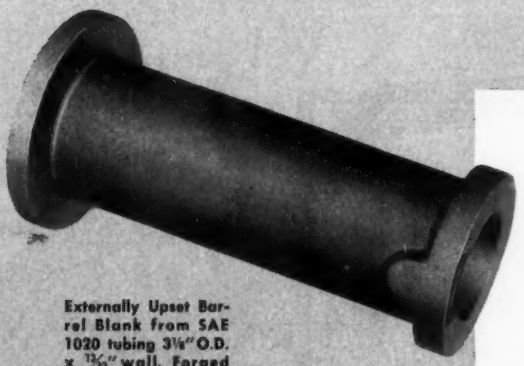


Internally Upset CO_2 Cartridge from SAE 1020 tubing 1⅛" O.D. x .123" wall. Finished length 7".

Advanced upset technique saved O.E.M. 25%..."Task-Forging" formed neck 4 times wall thickness in 1 pass (Conventional practice requires 4 passes)

- Customer now buys only 1 part—machining and assembly of insert eliminated
- Strength of pressure vessel increased by 1-piece design
- 18% reduction in scrap—customer trim at sealed end eliminated

OBJECTIVE: How to increase your profit margin
METHOD: By ingenious upsetting of unusual parts



Externally Upset Barrel Blank from SAE 1020 tubing 3⅛" O.D. x 13/32" wall. Forged length 10.062". Forged tolerances to ±1/32".

Flanges and boss upset on "Task-Forged" tube...machining reduced 33%, metal 15%

- Now 1 piece instead of 4—originally a weldment of 2 flanges, a boss and a tube
- Greater strength—toughness portioned where needed
- More accurate than mill tolerance of tubing

Some call it ingenuity. At COMMERCIAL it's the basic philosophy for keeping a long step ahead of competition.

Very simply...our customers are in business to show a profit; we contribute by delivering unusual upset forged components at a better cost—the result of complete design analysis and 35 years of continually perfecting new upsetting techniques that go far beyond conventional limits.

COMMERCIAL's "Task-Forging" team of engineers are experts in establishing the production techniques and die design patterns for extraordinary upset requirements ...particularly heavy forgings involving the internal, external and pierced displacement of metal.

Behind them is the versatile modern COMMERCIAL plant which produces uniformly sound, metal quality upset forgings which are performance-tested and very often include design improvement for the customer's benefit. Facilities include upsetters from 1½" through 8"...threading equipment handling up to 6½" diameter stock, and rough or semi-finished machining.

These unusual forgings typify customer benefits which resulted from a little ingenuity and a lot of "know-how" as applied by this "Task-Forging" team of experts. It is just possible that they can discover hidden profits in your component parts. No obligation. Address: Commercial Shearing & Stamping Co., Dept. L-50, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

9 trouble-free years— still no trouble in sight

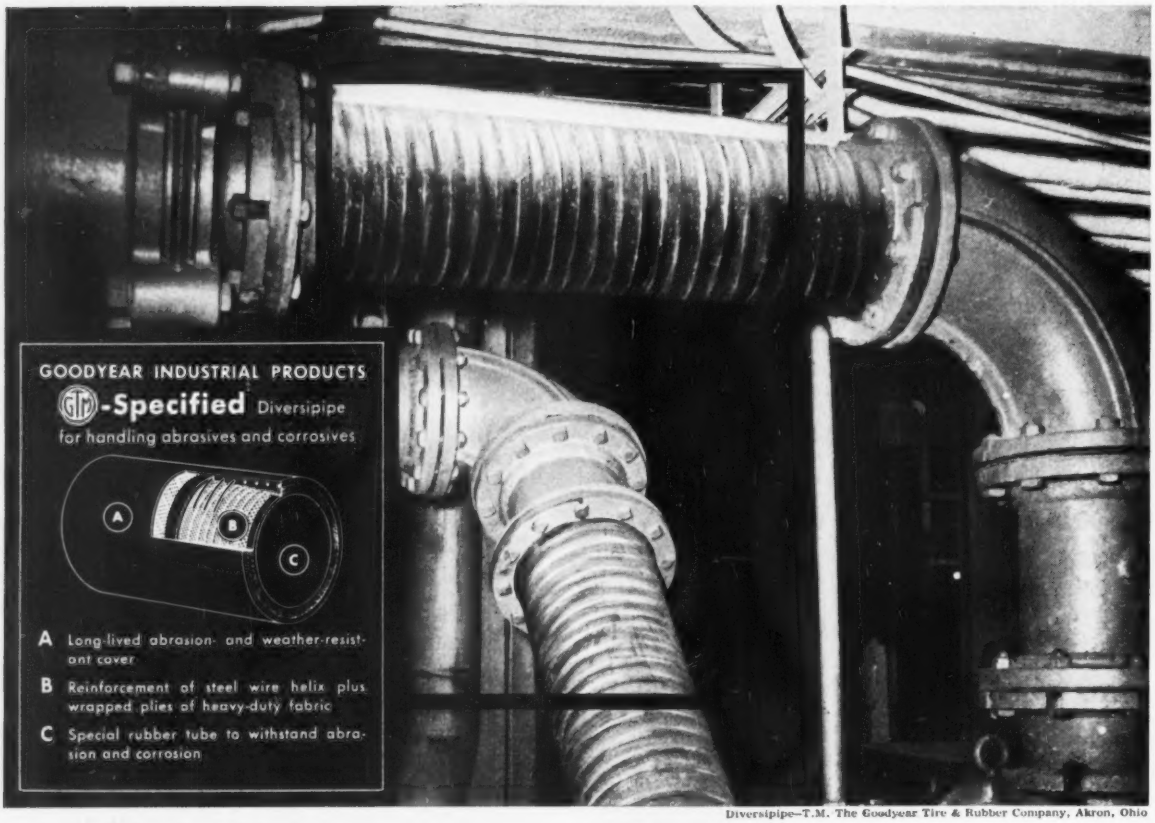
HANDLING the murderous abrasion of iron-ore slurry was only part of the problem when they added new facilities at this big Northeastern mine. There was also incessant vibration from pumps and refiners—certain to encourage leakage and shorten the life of just about any kind of slurry lines used.

But not if the lines were Diversipipe: recommended by the G.T.M.—Goodyear Technical Man. That super-tough rubber pipe fights off abrasion—absorbs shock. A bonus benefit: its flexibility makes intricate installations easier and less expensive.

At last report, the Diversipipe had been handling minus 14 mesh slurry—at 10 feet per second—for 9 straight, trouble-free years. And it's still giving like-new performance.

In fact, Diversipipe has proved the moneysaving answer to tough material-handling problems like this in many a plant. For expert tips on handling pumpable materials—especially abrasives or corrosives—check with the G.T.M. through your Goodyear Distributor. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*


GOODYEAR INDUSTRIAL PRODUCTS
GTM-Specified Diversipipe
for handling abrasives and corrosives
A
B
C
A Long-lived abrasion- and weather-resistant cover
B Reinforcement of steel wire helix plus wrapped plies of heavy-duty fabric
C Special rubber tube to withstand abrasion and corrosion

Diversipipe—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

DIVERSIPIPE BY

GOODYEAR

THE GREATEST NAME IN RUBBER

STEEL
Servicenter

Please direct all correspondence to attention of Ed Service, STEEL, 1213 W. Third St., Cleveland 13, Ohio.

December 7, 1959

'I'll Take the T-bird . . .

. . . Fire engine red!" That's the confident request on a Beat-the-Experts coupon submitted by William C. Griffin, purchasing agent, L. S. Watlington Mfg. Co., Bloomington, Ill.

That breezy entry could crease an even broader grin in the normally smiling face of George W. Walker, Ford Motor Co. vice president and director of styling. Mr. Walker, right, is the man responsible for the "metal-in-motion" concept that typifies the missile age lines of the 1960 Fords. One of you will be beneficiary of Mr. Walker's design talent for two weeks. All you do is predict the number of U. S. passenger cars that will be built in the first half of calendar 1960. If you're the one who comes the closest to the actual figure, you will have two weeks of wheeling around any one of the 19 cars in the six Ford lines.

Five next best guessers will earn full color prints of a dream car styled and signed by Virgil M. Exner, Chrysler Corp. vice president and director of styling.

You can find a fuller explanation of the contest in the Nov. 16 STEEL, p. 5. (All that's needed is your entry on the handy coupon in this department. Clip and mail it today.)

Sign of the Labor Times

Assistant Editor John Teresko interviewed a plant manager at lunch a few weeks ago. The manager ordered a large onion sandwich, explaining: "Pardon the onions, John, they have a purpose. I have a grievance meeting with the union this afternoon."

Creatures of Habit, Beware!

The editors have been putting in hours and hours of overtime on our 1960 Yearbook. Vance Bell and Bob Jaynes have been busy producing the 48 page Facts & Figures section, which is jampacked with vital metalworking statistics. Last week, Bob felt a little Saturday work was in order.

On the fateful day, he was caught in a driving rain. For the first time in his eight years with STEEL, Bob varied the route of his 10 minute walk from the train station to the office. He scampered through back alleys in search of cover afforded by buildings.

Upon his dampish arrival at the office, he heard sirens. A glance out of the window informed him that a brick parapet on a building one block away had tumbled to the sidewalk—the sidewalk he normally traversed.

He checked the time of the incident with the police—he had missed the avalanche by 3 minutes—exactly the time it takes to get from the accident scene to his office.

Moral: Work like hell during the week, or a brick wall is liable to fall on you.

Things We Never Knew

Want an argument? Ask an engineer for the dimensions of an ingot ton of steel. We did and soon learned that it's a trifle more than 4 cu ft. We also got a lesson in ingot molds. Now don't check this with a slide rule, but the rule of thumb reads: "The weight of the mold is about the same as the weight of the ingot it contains."

Service on Service Centers

"Is there a trend by purchasing agents to buy from specialty warehouses?" The question was posed to STEEL by a Chicago specialty service center which has added a line of carbon steels. STEEL set to work. Editors whizzed about the country in person, via telephone, teletype, and letter, contacting service center managers and purchasing agents.

Result: No well defined trend.

A waste of time? Nope. The information will be worked into future articles on the distribution of metals.

Here are some of the facts: Specialty and general line warehouses are expanding to keep pace with the economy . . . Specialty firms tend to grow within their own areas to fill customer needs . . . General suppliers continue to pick up new lines . . . Purchasing agents feel the biggest ad-

I believe _____ automobiles will be produced in the U. S. from Jan. 1 through June 30, 1960.

Mail this to:
Beat-the-Experts
STEEL
Penton Bldg.
Cleveland 13,
Ohio

PRINT NAME _____
POSITION _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____

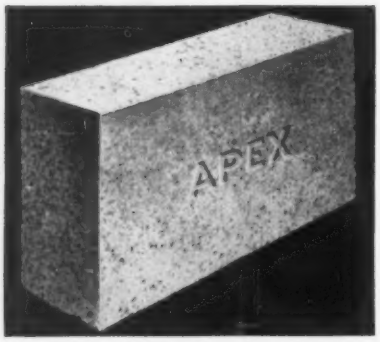
Profit from the Higher Bulk Density of . . .

WALSH

APEX

SUPER DUTY FIRE BRICK

Weigh in EXCESS of 150 lbs. per Cubic Foot



Apex, Super Duty Fire Brick Gives You More Fire Clay In Its Densest, Most Compact Form To Increase:

1. **Resistance to wear**
2. **Heat storage and heat flow**
3. **Hot load bearing strength**
4. **Resistance to slag penetration**

USES:
For record tonnage in Closed Hot Metal Torpedo Type Ladles, Hot Metal Mixers, and for maximum service and heat exchange in Hot Blast Stove Checkers and Open Hearth Checkers.

WALSH REFRACTORIES CORPORATION
101 FERRY ST. · ST. LOUIS 7, MO.
FOR OVER 60 YEARS MANUFACTURERS OF HIGH GRADE REFRACTORIES

vantage of the general line supplier is the convenience of one call for all needs . . . The specialty firm's biggest asset is said to be more thorough technical knowhow and complete stocks of its line.

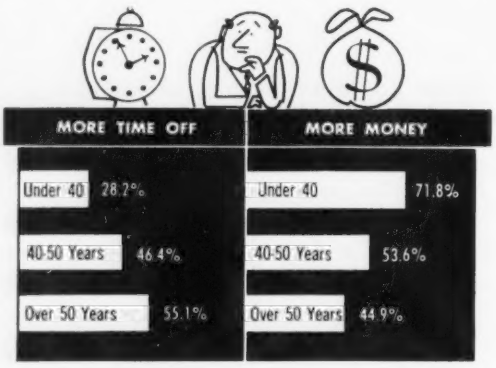
STEEL Goes to Congress

Tennessee Products & Chemical Corp., Nashville, Tenn., has been given permission to reproduce STEEL's Oct. 12 article, "Needed: 'Buy American' Act Reform in 1960." Here's the request from G. L. Wallace: "We have been contacting congressmen and senators in states where we operate production facilities, urging them to support strengthening the 'Buy American' Act. Though response was favorable, little was accomplished during the last session of Congress.

"We would like to place this article before these men when Congress reconvenes. It will give them a better understanding of the foreign competition threat facing American metalworking and acquaint them with the urgent need for remedial legislation."

Which Do You Prefer . . .

. . . More time off or more money? The *Harvard Business Review* and the Twentieth Century Fund asked 15,000 executives and discovered:



Welding Case Reopened

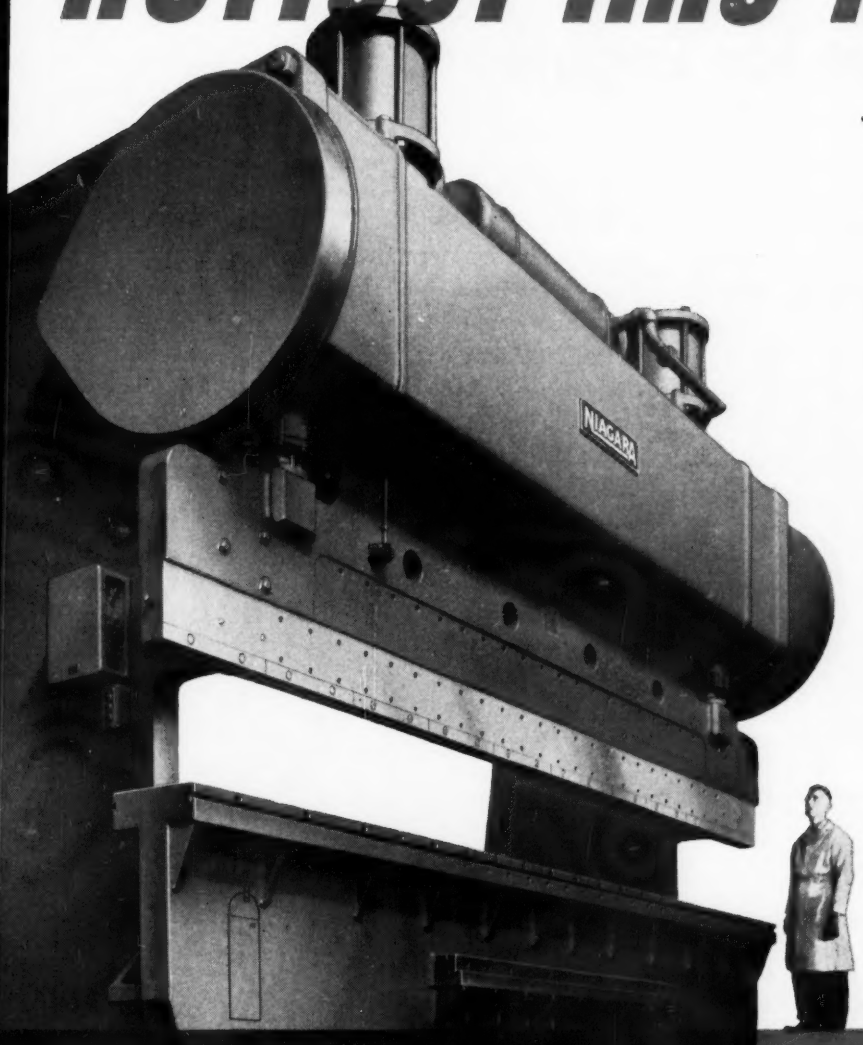
STEEL's July 20 article, "Are Too Many Tests Hurting Welding?" created quite a stir in the welding field. We were flooded with readers' proposals and counterproposals on how to square away standards and testing.

Next week, in a sequel to the first article, the editors call upon Helmut Thielsch, a metallurgical engineer with Grinnell Co. Inc., Providence, R. I., for his views. He says, in part: "Price cutting is ushering in poorer weld quality, and price conscious users willingly go along—until rejects haunt them. There's a trend toward looser inspection requirements."

Mr. Thielsch also offers some self-help remedies, with emphasis on stricter adherence to standards and control procedures.

NIAGARA PRESS BRAKES

hottest line in '59



...way out front in production-boosting, cost-cutting features... highest dollar value of all

Hottest line in the industry, more Niagara Press Brakes are being bought today than ever before.

What's behind it? **Performance!** Downright, measurable, press brake performance! High hourly output with minimum operator effort is setting new work standards in plant after plant.

How about you? Want to sail through your schedules at record-breaking speed... cut your operating and maintenance costs to the bone... hold your capital investment to a **practical minimum... then Niagara is the press brake for you.**

Talk it over with a Niagara sales engineer. He has the facts to give you a fair comparison **...on every point.**

77 sizes to choose from

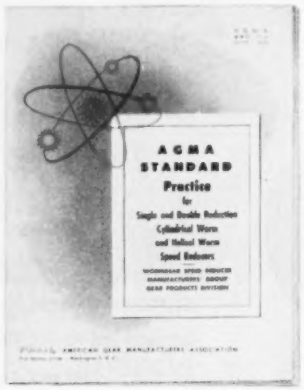
- 15-1500 tons
- Power or Manual Clutch
- Smooth, micro-inching ram
- Wear resistant, non-metallic ways
- Gearing enclosed in sealed oil bath

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

DISTRICT OFFICES: Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia
Distributors in principal U. S. cities and major foreign countries

DE LAVAL offers new A.G.M.A. Gear Standards Booklet for Engineers

You will not want to be without this newly published American Gear Manufacturers Association booklet. It outlines the new standards for single and double reduction cylindrical worm and helical worm speed reducers.



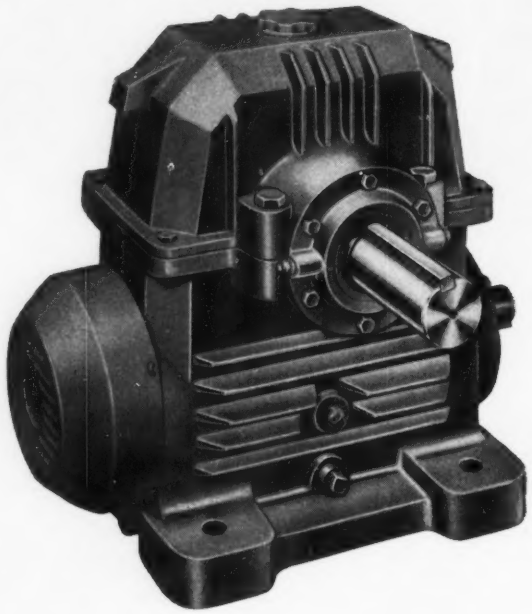
Get this new A.G.M.A. 440.03 booklet free of charge by request on your company letterhead.

This new standards booklet contains important design data including: Power rating of worm gears • Ratio correction factor (Km) • Materials factors (Ks) • Velocity factor (Kv) • Coefficient of friction (μ) • Thermal factor • Service factors • Efficiency • Overhung load capacity • Lubrication.

The materials factor (Ks) and the coefficient of friction (μ) are new, reflecting the latest advances made in worm gearing in the past few years.

We have also recently published our new Delroyd Worm Gear Sets Catalog 3800 and Delroyd Single Reduction Worm Gear Catalog 3805, which contain comprehensive information on the selection of these units.

De Laval furnishes worm gearing under the trade name DELROYD and has a complete line from $1\frac{1}{8}$" to 36" center distance, in horsepower ranges from .04 to 700 and in ratios from 5: to 4900:.



DE LAVAL *Steam Turbine Company*

860 NOTTINGHAM WAY, TRENTON 2, NEW JERSEY

DL-493

THE ONES THAT WILL LAST (and last, and last!)? THOSE MADE OF WEIRKOTE® ZINC-COATED STEEL!

Laboratory salt-spray tests prove it. Leading manufacturers prove it. Experience proves it. Primary window frames and storm and screen frames of Weirkote zinc-coated steel last and last and last—literally shrug off the elements!

Weirkote will not give in to corrosion invasion because its zinc coat clings tightly to its steel surface year after year. Reason? Zinc and steel are actually integrated by Weirkote's continuous process.

This extra protection pays off when it comes to fabricating Weirkote, too. You can crimp it, twist it, torture it—work it to the limits of the steel itself—without chipping or flaking its surface. And this pays off in your pocketbook: No more costly rejects, and coating after fabrication can be eliminated.

Whether you're talking profit or product, there's a lot to be said for Weirkote zinc-coated steel. Write today for a free booklet that tells all about it. Weirton Steel Company, Dept. B-14, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

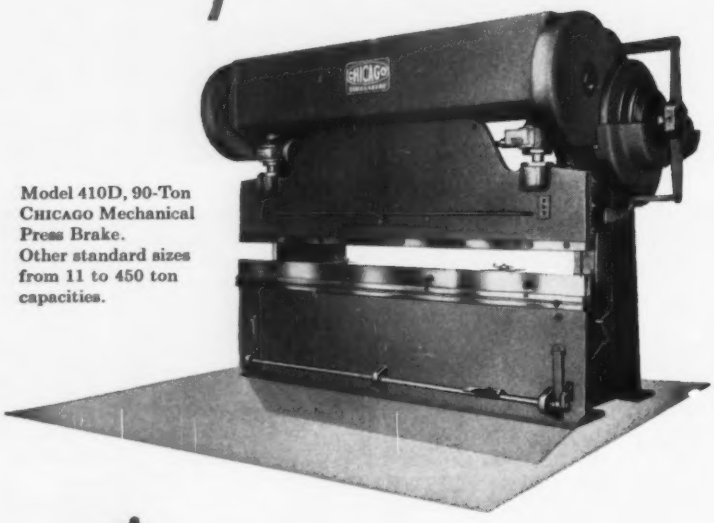
WEIRTON, WEST VIRGINIA

a division of

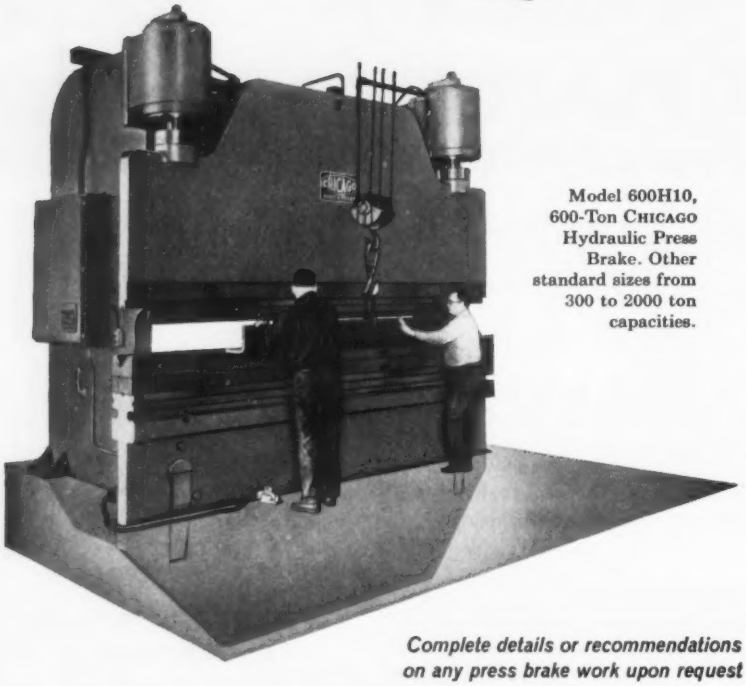
NATIONAL STEEL CORPORATION

CHICAGO® PRESS BRAKES

unexcelled accuracy / ***for sheet metal and plate work***



Model 410D, 90-Ton CHICAGO Mechanical Press Brake. Other standard sizes from 11 to 450 ton capacities.



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Complete details or recommendations on any press brake work upon request

8430

Press Brakes
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Straight-Side-Type Presses
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Special Forming Machines

CHICAGO DREIS & KRUMP

DREIS & KRUMP MANUFACTURING CO.
7458 S. Loomis Blvd., Chicago 36, Illinois

CALENDAR OF MEETINGS

Dec. 15, Material Handling Institute Inc.: Annual meeting, Savoy-Hilton Hotel, New York. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

1960

Jan. 6-8, American Management Association: Special packaging conference, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y.

Jan. 10-13, Institute of Scrap Iron & Steel Inc.: Annual meeting and exhibit, Fontainebleau Hotel, Miami Beach, Fla. Institute's address: 1729 H St. N. W., Washington 6, D. C. Executive vice president: Edwin C. Barringer.

Jan. 11-15, Society of Automotive Engineers Inc.: Annual meeting and engineering display, Sheraton-Cadillac and Statler-Hilton Hotels, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Jan. 15, Malleable Founders' Society: Semi-annual meeting, Sheraton-Cleveland Hotel, Cleveland. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio.

Jan. 18-19, Industrial Heating Equipment Association: Annual meeting, Warwick Hotel, Philadelphia. Association's address: Associations Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 18-21, American Road Builders Association: Annual convention and highway materials and services exhibit, Netherland-Hilton Hotel, Cincinnati. Association's address: 600 World Center Bldg., Washington 6, D. C. Executive vice president: L. W. Prentiss.

Jan. 19-20, Steel Shipping Containers Institute Inc.: Winter meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 20-22, American Management Association: Research and development conference, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y.

Jan. 20-22, Steel Plate Fabricators Association: Annual meeting, Roosevelt Hotel, New Orleans. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Jan. 21-22, National Industrial Conference Board Inc.: General session for all associates, Hotel Commodore, New York. Board's address: 460 Park Ave., New York 22, N. Y.

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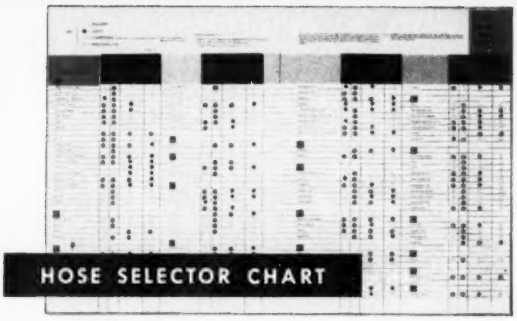

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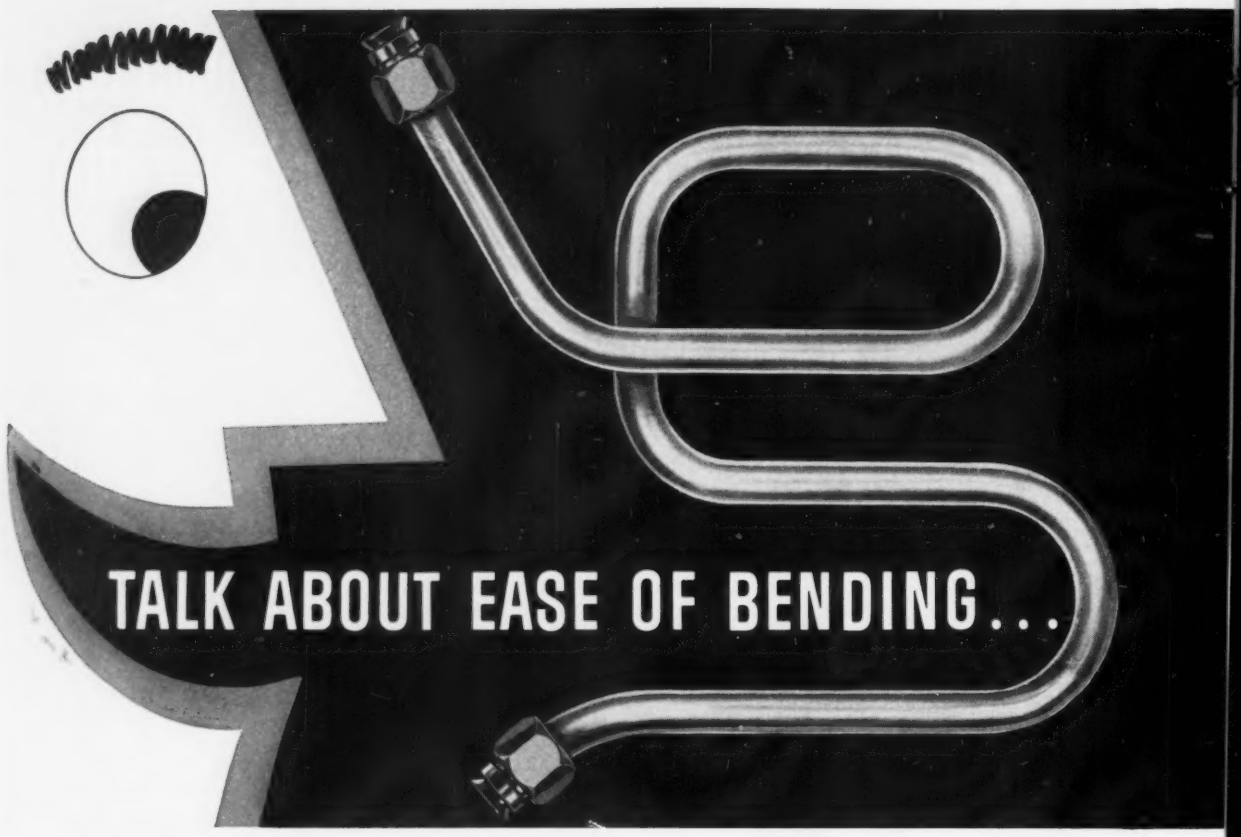

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The welded hydraulic fluid line tubing that offers lower initial cost...appreciable savings in downtime

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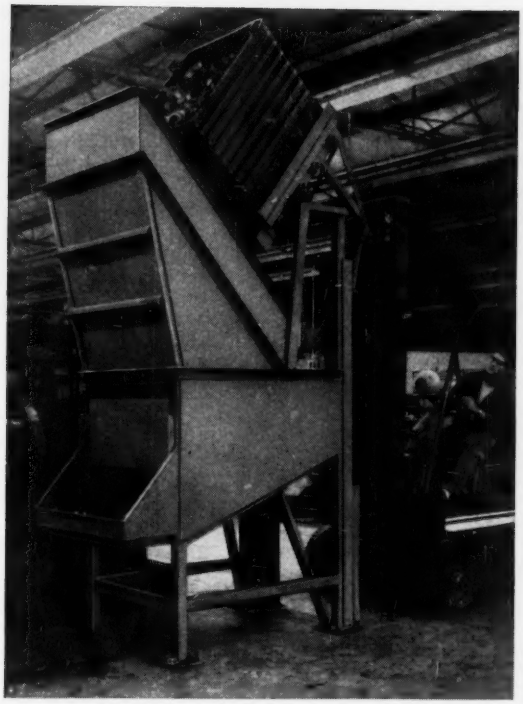

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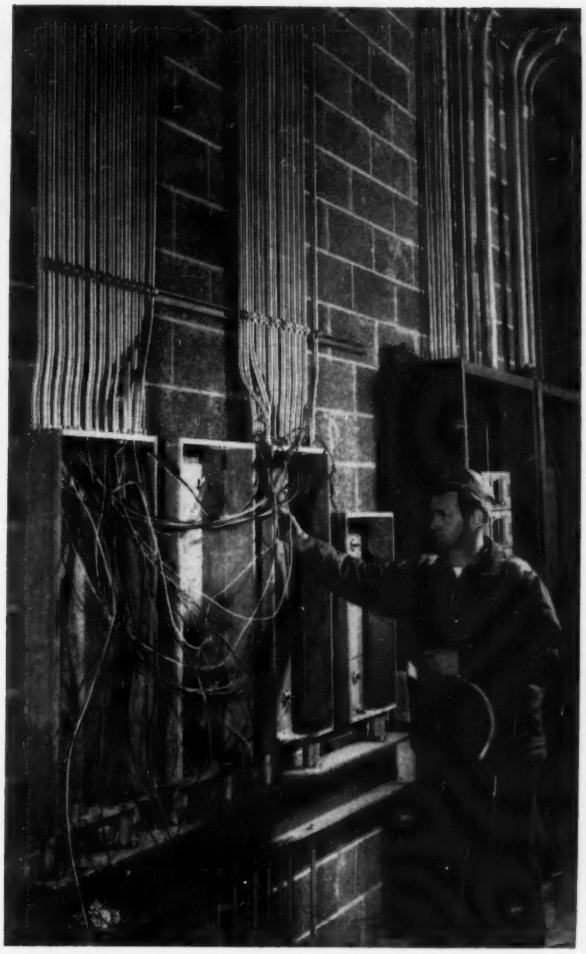

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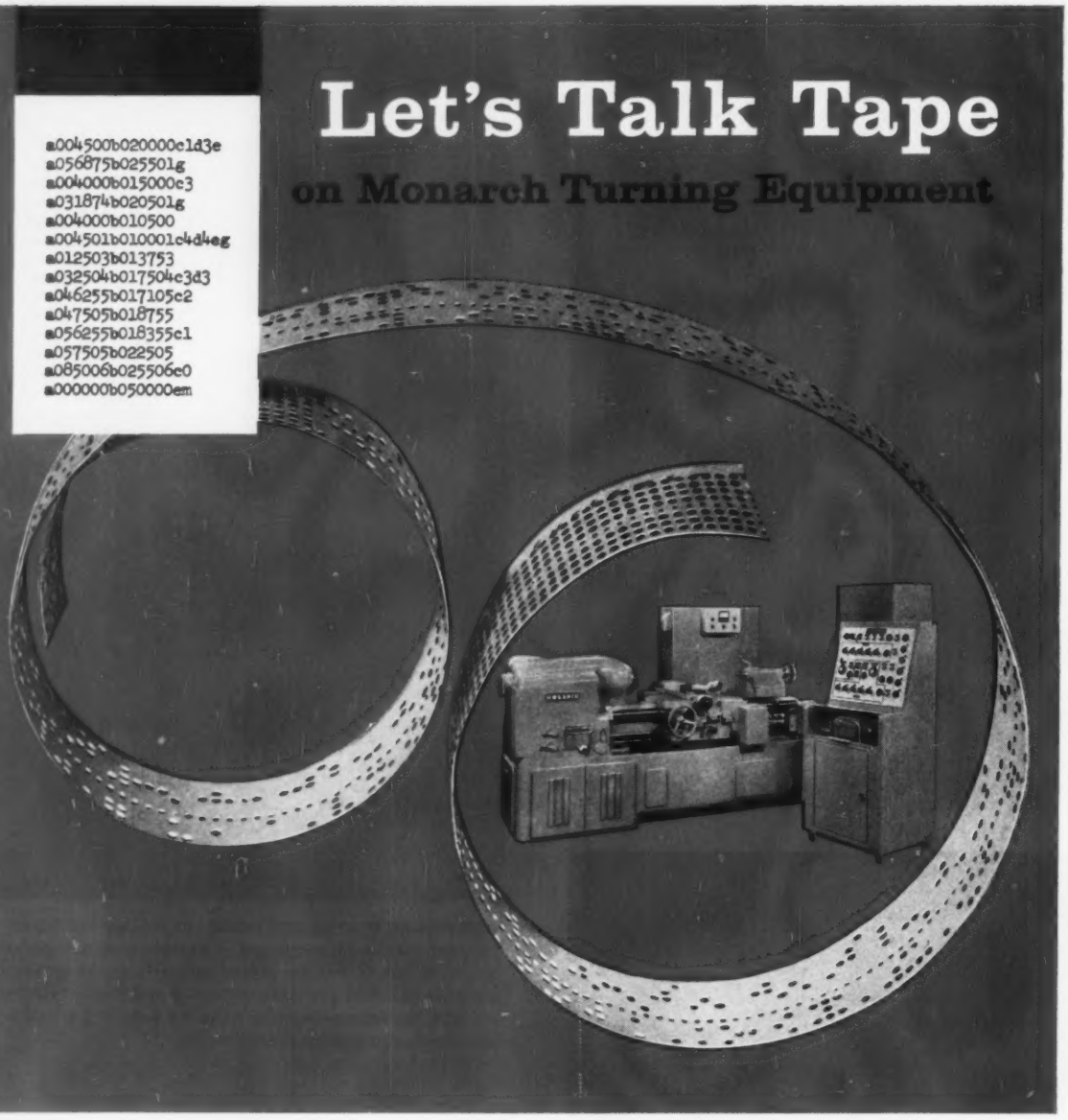
Let's Talk Tape

on Monarch Turning Equipment



We'll start by saying simply—Monarch Lathes can be furnished with Numerical Control.

This modern control method has been applied with great success on certain other types of machine tools. For a long while we have been aware of interest in its possibilities on turning equipment. But the fact we offer Numerical Control does not mean we are unaware of the necessity of considering carefully the economics of each turning situation.

Where lathes are concerned, the economical application of Numerical Control depends on two factors:

1. *The number of individual jobs to be run.*
2. *The allowable time lag between completion of drawings and completion of machining.*

Are your problems a multiplicity of turning jobs and lightning-fast conversion of drawings into finished work pieces?

If the answer is "YES," the place to start talking is with *The Monarch Machine Tool Company*, Sidney, Ohio.

Let's talk!

Monarch TURNING MACHINES

IF IT CAN BE TURNED, THERE'S A MONARCH TO DO IT BETTER AND FASTER

Youngstown Alloy Bars
are heated to 2000° F. for the main leaf eye-forming operation.

Accent on Excellence

Youngstown alloy bars

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That's because manufacturers know they can depend on Burton for top-flight engineering and fabrication plus the best in raw materials — Youngstown Alloy Bars. These bars are free from seams and inclusions that could cause premature spring failure in service.

Wherever steel becomes a part of things *you* make, the high standards of Youngstown *quality*, the personal touch in Youngstown *service* will help you create products with an "accent on excellence". The Youngstown Sheet and Tube Company, Youngstown, Ohio. Carbon, Alloy and Yoloy Steel.

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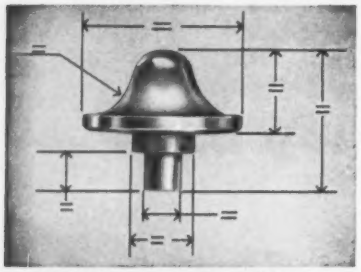

Another example of how Hubbell Cold Heading produces Better Parts at Faster Speeds, at Lower Cost

THE PART:
Click Button

THE MATERIAL:
Brass

THE METHOD:
Hubbell cold heading in place of screw machining.

THE RESULT:
This brass click button was machined previously from bar stock, involving several different operations that removed nearly 50% of the total weight of the original stock . . . a wasteful, time-consuming, costly process.

Hubbell now produces essentially the same part at tremendous savings in time and material cost.

a. Production is increased from the original rate of 5.5 pcs. p.m. to cold heading rate of 60 pcs. p.m.

b. Labor, overhead and material cost has been reduced 36%.

c. The finished part is stronger, more accurate, with greater uniformity.

Hubbell Cold Heading may provide equally dramatic results for you. Whether it is presently cold headed or not, send blueprint of part or sample for analysis and estimate.

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Bridgeport 2, Connecticut

Kindly estimate on the enclosed sample (blueprint) Quantity _____

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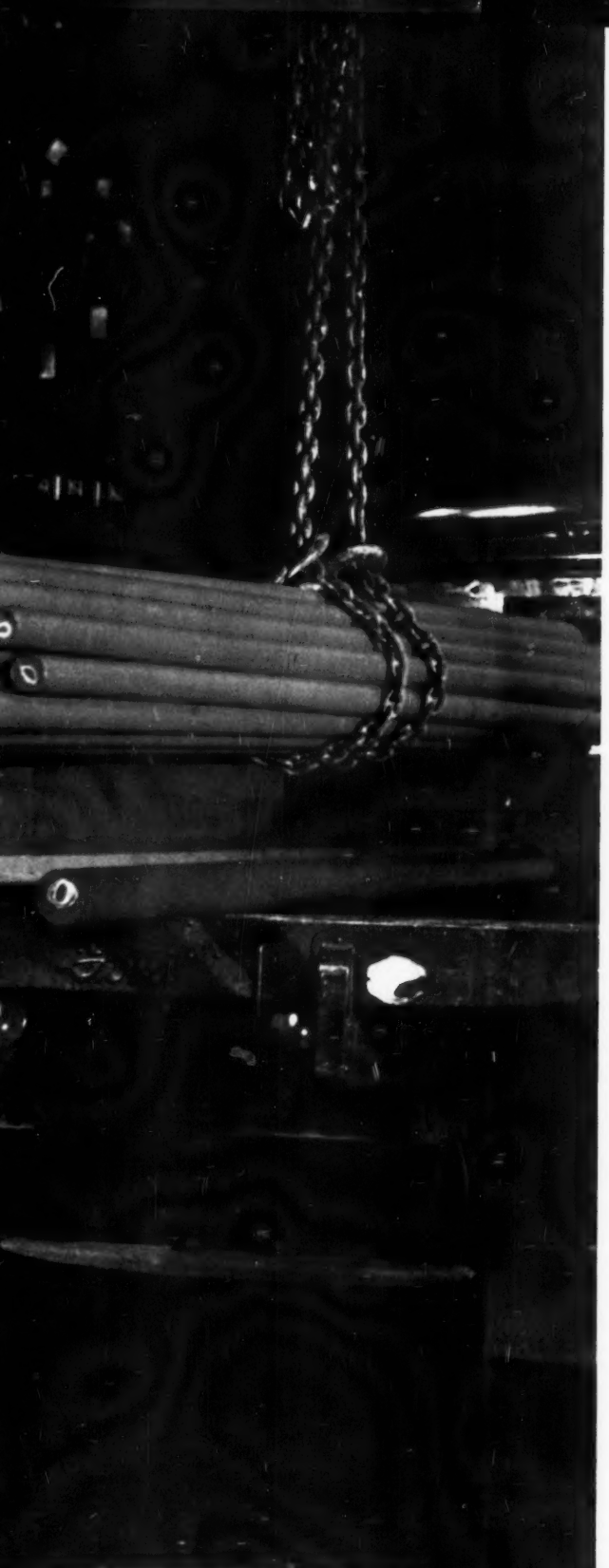

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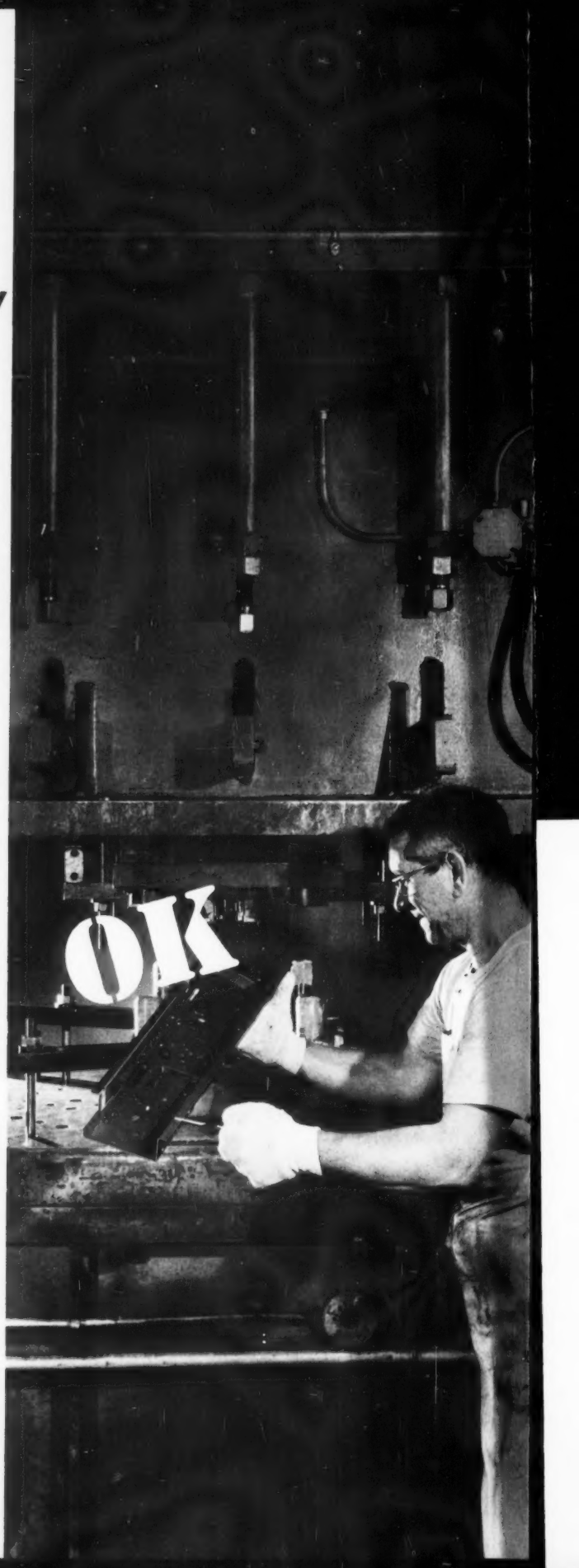
you could forecast
with the same accuracy
the performance of the

tool and die steels

you use?



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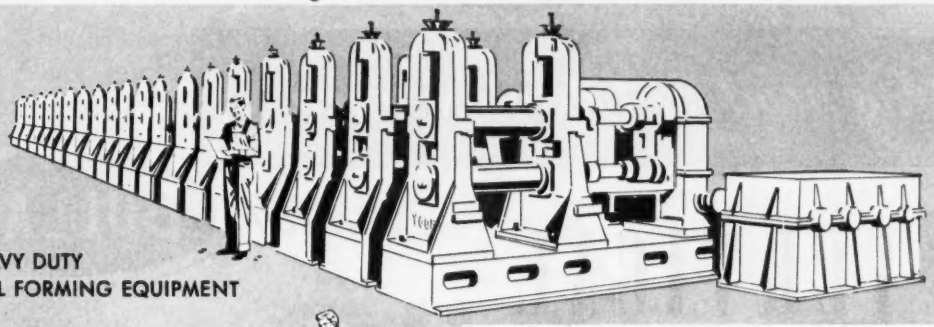

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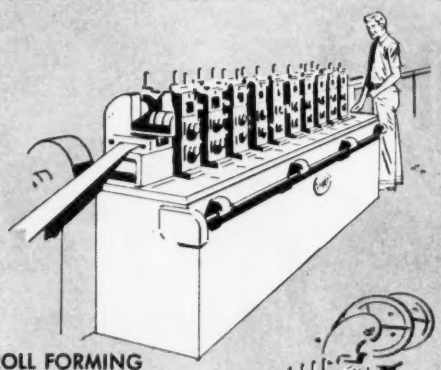

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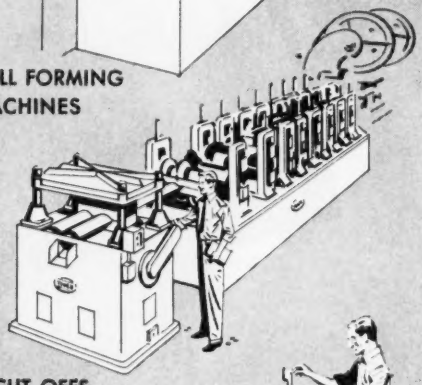

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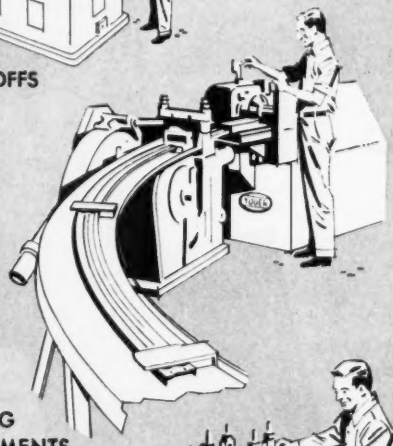

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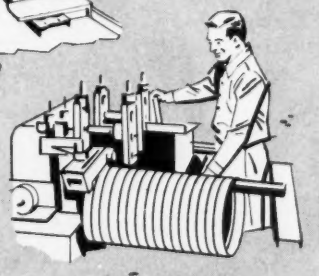

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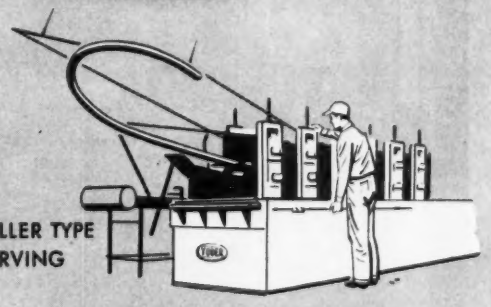

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for profitable mass production

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In addition to Roll-Forming machinery, YODER also makes a full line of Rotary Slitting equipment, Pipe and Tube mills. Send for the fully descriptive Cold Roll-Forming Book.

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no need for Obsolescence

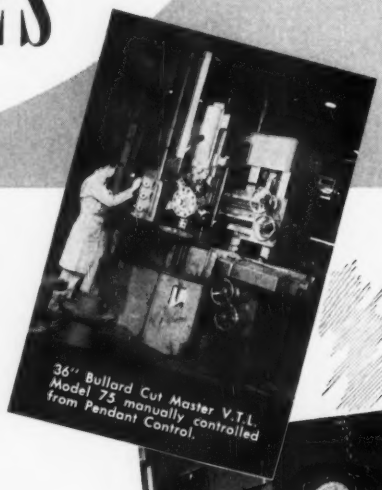
with BULLARD

VERTICAL TURRET LATHES

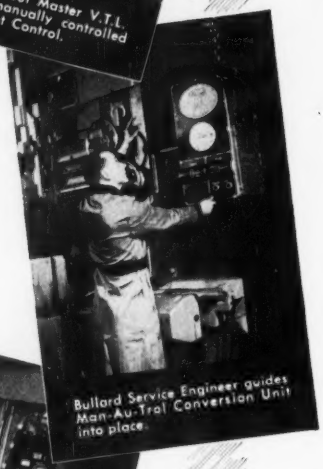
Model 75

In May, 1955, Hyster Company, Peoria, Illinois, installed a 36" Cut Master V.T.L., Model 75 and by the end of 1956 it was evident that due to increased requirements an automatically controlled machine was necessary. *Did this obsolete the Cut Master?* — No sir — it only meant adding a Man-Au-Trol Conversion Unit to Cut Master *right in their plant. And it was accomplished in only four days.* No need to obsolete Bullard Cut Master, Model 75 — just convert them.

another way to cut costs when cutting metal — **buy BULLARD**



36" Bullard Cut Master V.T.L. Model 75 manually controlled from Pendant Control.



Bullard Service Engineer guides Man-Au-Trol Conversion Unit into place.

Electrical connections for Man-Au-Trol are wired into Cut Master Control Panel.

Man-Au-Trol installed for automatic control of Turret Head.

For the complete information on Bullard Vertical Lathes call our nearest Sales Office or Distributor.

THE BULLARD COMPANY

BRIDGEPORT 9, CONNECTICUT

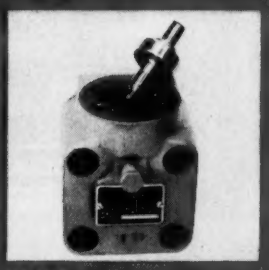
Keep your equipment upkeep down with . . .

ATLANTIC HYTHERM OILS

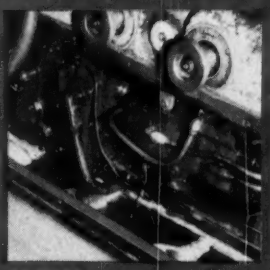
Economical, turbine-quality lubricants with all properties recommended by hydraulic equipment builders

Atlantic Hytherm Oils give outstanding service throughout hydraulic systems

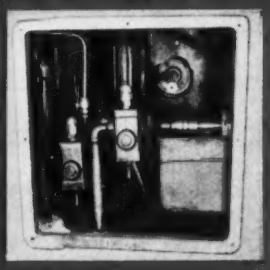
PUMPS Wear is kept to a minimum. Pump parts remain free of choking varnish deposits for efficient operation.



VALVES Carefully selected additives combine with high-quality oils to prevent wear, rusting and deposit formation.



ORIFICES Freedom from deposits in valves, orifices and drains helps keep equipment at work, reduces maintenance costs.



SUMPS Rapid dissipation of foam in oil sumps avoids pump cavitation and annoying shutdowns, reducing costly down time.

The type of fluid power transmission medium used in a hydraulic system is largely responsible for its economical and effective operation. Realizing the importance of oil stability to successful service, manufacturers of hydraulic equipment long have recommended oils having the same properties found in turbine lubricants which must operate continuously for long periods of time.

Atlantic Hytherm Oils are basically turbine quality products. They are produced from solvent treated paraffin base stocks which have a high viscosity index. In addition, they are fortified with additives to resist oxidation and foaming as well as to protect machine parts against rust.

The most outstanding feature of Hytherm oils is their anti-wear characteristic . . . a direct result of this unique additive combination. Compared in performance under identical conditions, with high-quality straight mineral oils of comparable viscosity, Atlantic Hytherm Oils actually cut wear-rate of vane type pump parts 100 times. Savings in maintenance costs and equipment down time far exceed the moderate increase in cost of the Hytherm oils above ordinary mineral oils.

And Atlantic Hytherm Oils also provide excellent versatility. In fact, they've been used successfully in a variety of "hot-oil" heat exchange systems with a minimum of undesirable deposits. They are highly recommended for lubricating compressor cylinders, rotary compressors, enclosed gear and chain drives, dryer roll circulating systems, machine tool drives, small steam turbines and other applications where over-all stability is highly necessary.

Your Atlantic Sales Engineer will welcome the opportunity to discuss the application of these oils to your specific requirements. In cases where detailed analysis is required, the facilities of the Product Development & Technical Services Division are at your disposal, entirely without obligation. Simply call or write to The Atlantic Refining Company, Pennypacker 5-2345, 260 S. Broad Street, Philadelphia 1, Pa.

ATLANTIC

CHOOSE FROM OUR FULL RANGE OF HIGH-QUALITY OILS TO MEET YOUR LUBRICATION NEEDS

Providence, R. I., 430 Hospital Trust Bldg. • Syracuse, N. Y., Salina and Genesee Sts. • Reading, Pa., First and Penn Aves. Pittsburgh, Pa., Chamber of Commerce Bldg. • Charlotte, N. C., 1112 South Boulevard

"...WE ALWAYS SPECIFY STAR BLADES FOR FASTER CUTTING"

Your production manager may not have actually had a hack saw blade or a band saw blade in his hands for years. But he's well-acquainted with the mathematics of metal cutting. Output is his specialty... and the record shows that Star blades can help step it up.

The steel in Star hack saw blades is the finest. Specially designed equipment forms sharp cutting teeth to shape and size... assures uniform set and temper of teeth throughout. The wide Star line provides the right blade to do each cutting job efficiently and economically.

Your nearby Star Distributor can help you pick the right hack saw or band saw blade according to the requirements of the job. You'll find him to be a good man to know when you're faced with a metal cutting problem. He can be of real assistance to you.

Free literature — The Star Metal Cutting Wall Chart and the Star Metal Cutting Guidebook have been put together to help you run a more efficient metal cutting shop. They list all the types and sizes of hack saw and band saw blades, help your men pick the best one for the job. Write for your free copies of both.

㊥ 2056

STAR
Band Saw Blades in revolutionary new Reel-Pac Dispenser

— in sizes up to and including 1" — the convenient way to store and handle band saw blades. User simply slides out and cuts length needed. Excess goes easily back into Reel-Pac.

Star makes a full line of Power Hack Saw Blades, Band Saw Blades and Hand Hack Saw Blades and Frames — one for any metal cutting need.

Write today for full details.

STAR HACK SAW and BAND BLADES

Manufactured by CLEMSON BROS., Inc.
Middletown, N.Y., U.S.A.

Warehouses in Brooklyn • Chicago • Denver • Houston • Los Angeles • Newark • New York City • Portland, Ore.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades and Clemson Lawn Machines

proven design features . . .

Here is the first in the all new, field tested line of heavy duty Nebel Lathes.

It is a versatile extension bed gap lathe, providing 26½" swing over the upper bed, 46" swing through the gap and 48" to 84" distance between centers in the base length.

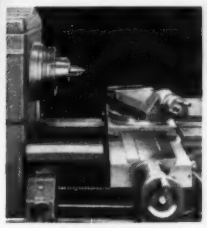
It is built to complete A.S.A. standards and tolerances of accuracy for engine lathes, still maintaining Nebel economy.

- Heavy duty 3-bearing spindle with zero precision bearings.
- 18 spindle speeds through complete gear range . . . up to 1500 RPM . . . streamlined speed selection.
- 60 different feeds . . . 60 thread changes, all directly read.
- Automatic lubrication.
- Wide design carriage with 146 square inches of bearing surface on bed ways.
- Double-wall one piece totally enclosed apron with simplified controls.
- End gearing totally enclosed in self-lubricating housing.
- Power traverse heavy duty tailstock with rugged thrust lock.
- Rigid box girth design of upper and lower bed . . . hardened and ground steel bedways on upper bed.
- Maximum diameter in gap faced in one setting of tool.

Write for new, fully descriptive Bulletin No. 211.

Nebel Lathe Division • Nebel Machine Tool Corp.
3405 Central Parkway, Cincinnati 25, Ohio

a versatile gap lathe

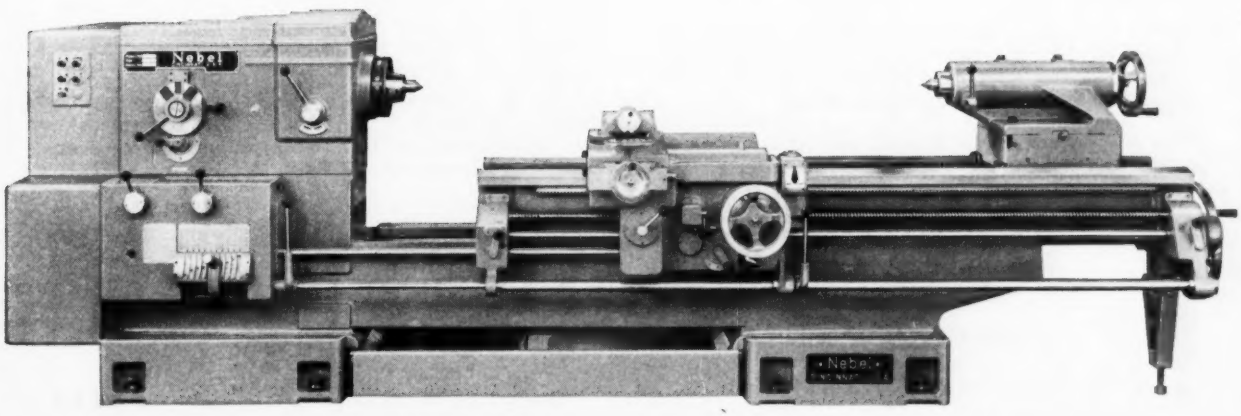


a rugged engine lathe

NēBEL

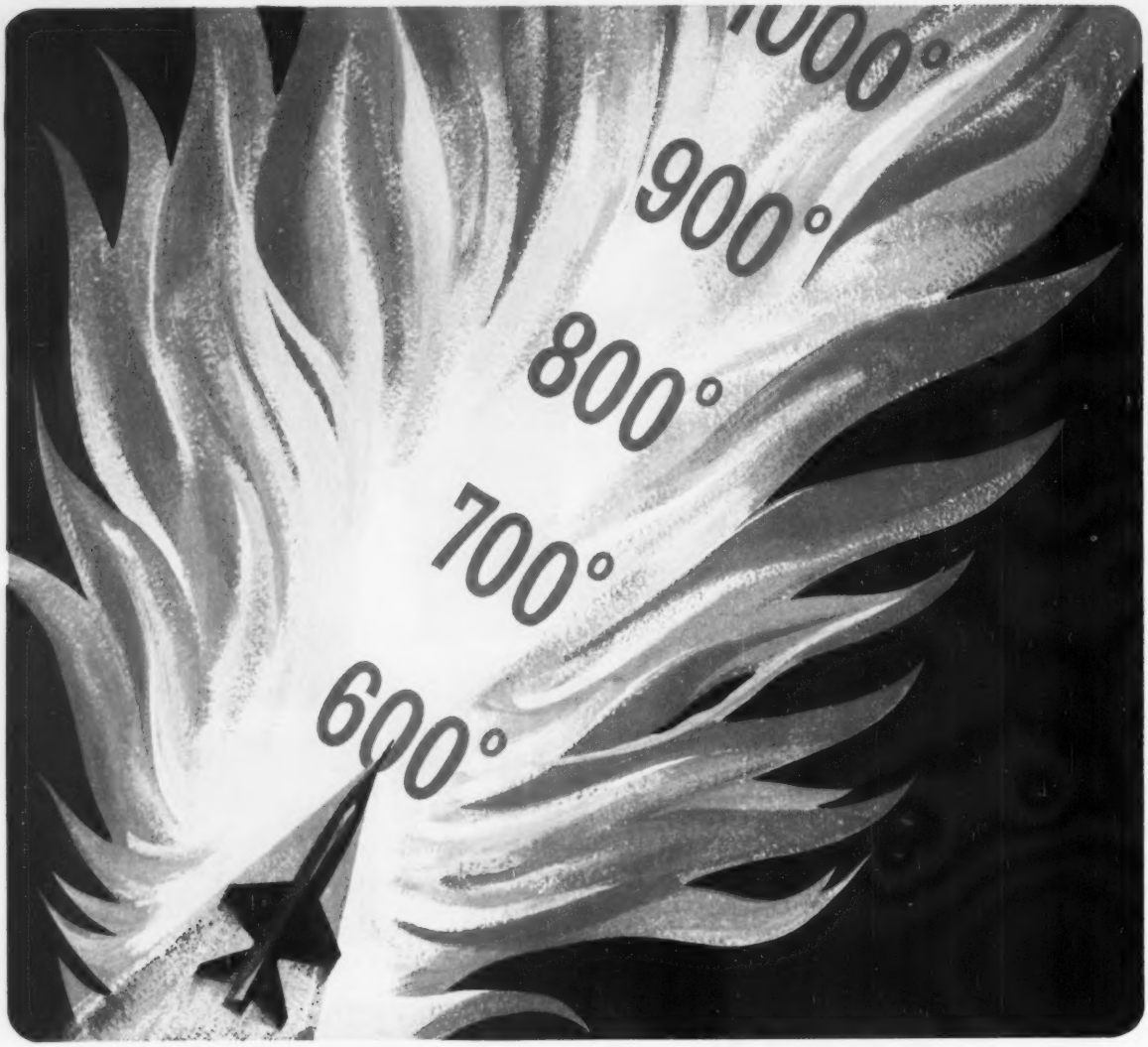
HEAVY DUTY DOUBLE PURPOSE LATHE

entirely new, proven design



NEBEL MODEL HXB 26/45 HEAVY DUTY EXTENSION BED GAP LATHE

Experience**—the added alloy in **Allegheny Stainless



Easy-to-form metals with high strength up to 1000 F

AM 350 and AM 355, precipitation hardening stainless steels by Allegheny Ludlum have many advantages for designers of missiles and supersonic aircraft in solving space age problems.

Among their many desirable properties, AM 350 and AM 355 combine high hardness and strength and stability up to 1000 F and yet possess good ductility. They are easy to form in the annealed condition.

They can be spun, drawn, formed, machined and brazed or welded using normal stainless steel procedures.

Both steels have excellent corrosion resistance and good resistance to stress corrosion and oxidation at higher strength levels.

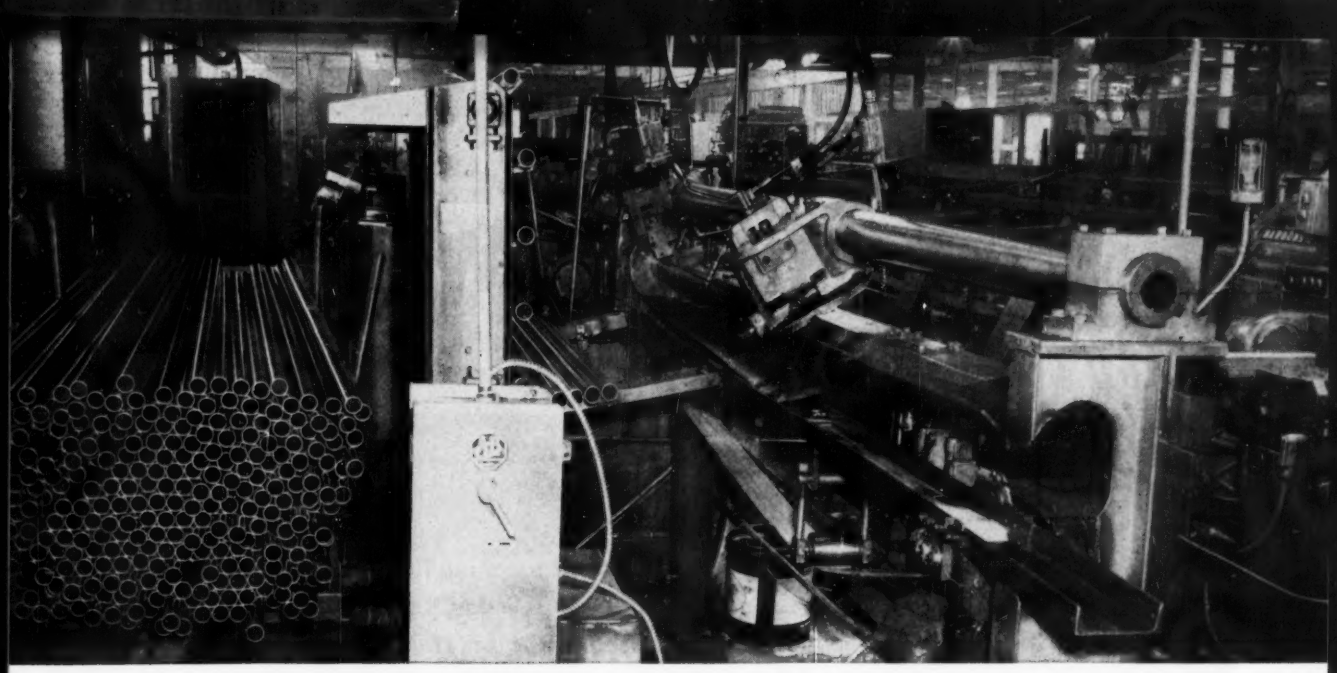
AM 350 is available commercially in sheet, strip, foil, small bars and wire. AM 355, best suited for heavier sections, is available commercially in forgings, forging billets, plates, bars, wire, sheet and strip.

For further information, see your A-L sales engineer or write for the new technical booklet, "AM 350 and AM 355." **Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.**

883

ALLEGHENY LUDLUM

EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT

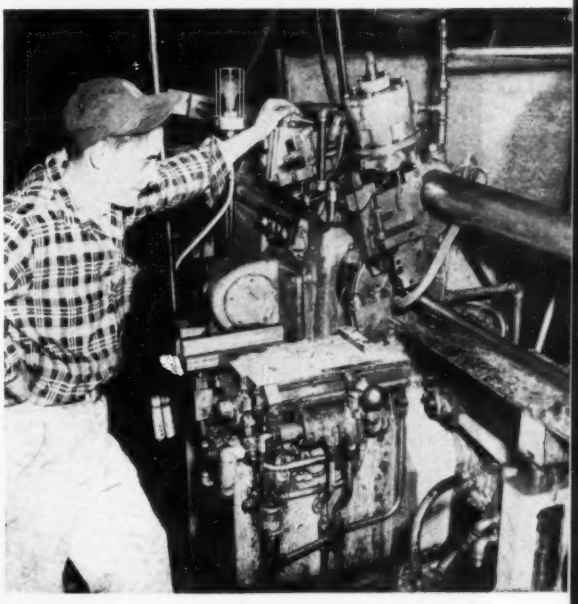


"Flexible Automation"

WITH BARDONS & OLIVER CUTTING-OFF LATHES

at Falls Steel Tube & Manufacturing Co., Newton Falls, Ohio

At Falls Steel Tube & Mfg. Co., manufacturers of exhaust pipes, tail pipes, and similar automotive tubular parts, the output of two electric weld tube mills is automatically transferred to three Bardons & Oliver loading tables. The tubing is then fed into three Bardons & Oliver Cutting-Off Lathes and automatically cut off in any required length from 6 inches to 10 feet. The cutoff lengths are automatically unloaded into tote trucks. Besides wide variance in length, tubing diameters vary from ½ to 3 inches and wall thickness from 14 to 20 gauge.



Victor Beltram, Chief Engineer, reports labor reduced by 75% and cutoff capacity increased by 50% with the Bardons & Oliver installation. Previously, cutoff operations were performed on circular sawing machines. The cutting-off lathes produce square ends and smooth finishes which have greatly facilitated secondary operations. The increased cutoff capacity has allowed greater utilization of all plant facilities. The complete Bardons & Oliver installation has paid for itself in less than three years.

If you cut off spacers, bushings, nipples, couplings, rollers, similar tubular products, or solid bar stock, we suggest you explore the profit possibility offered by these versatile machines. Bardons & Oliver manufactures a complete line of Cutting-Off Lathes ranging in collet capacity from 2 to 16 inches.

BARDONS & OLIVER

BARDONS & OLIVER, INC., 1147 WEST 9th ST., CLEVELAND 13, OHIO

Manufacturers of Turret Lathes and Cutting–Off Lathes

CF&I WIRE HELPS PACKAGED for YOUR PRODUCTION

"CF&I Stem-paks cut machine loading time 80%... give us an extra hour of production every day," stated Mr. Frederick Voos, Plant Superintendent, Risdon Manufacturing Co., Waterbury, Conn.

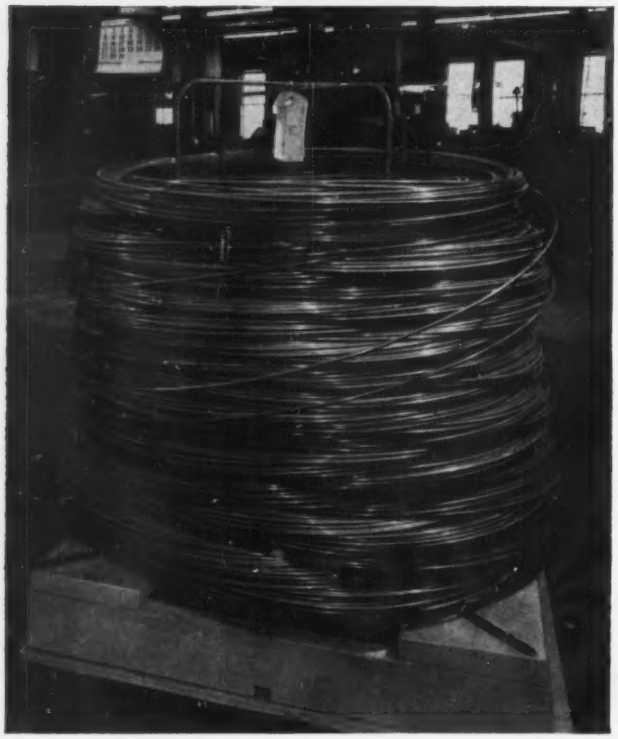
PROBLEM

1. "Our specially designed machines *were* fed wire from coils averaging 150 lbs. Because of the small size, frequent machine loadings were necessary. Each time, the coils had to be loaded by hand and the bindings clipped, after which the wire was guided through the straighteners before entering the machine. We were losing valuable production time due to excessive machine downtime," explained Mr. Voos.

SOLUTION

1. "Our Purchasing Department called a CF&I salesman who carefully examined our operation and recommended that we switch to CF&I Stem-paks which hold up to 1,000 lbs. of one continuous length of wire. Each Stem-pak feeds a machine for an average of one to two days... a production time equal to using seven coils with set-ups in the past.

"Stem-paks give us approximately an extra hour of production per day on each machine," Mr. Voos pointed out. "A Stem-pak can be set up in one-fifth of the time required for the seven coils of wire formerly used... *a saving of 80% on loading time.* The extra hour of production represents a 12½ % increase in the operator's production time."



CF&I Stem-paks are delivered on pallets for fast unloading and easy in-plant handling by fork trucks.

PROBLEM

2. "Part of our operation required the use of wire that was free from rust, grease or dirt. Too often, unprotected coils would collect dirt in transit or storage.

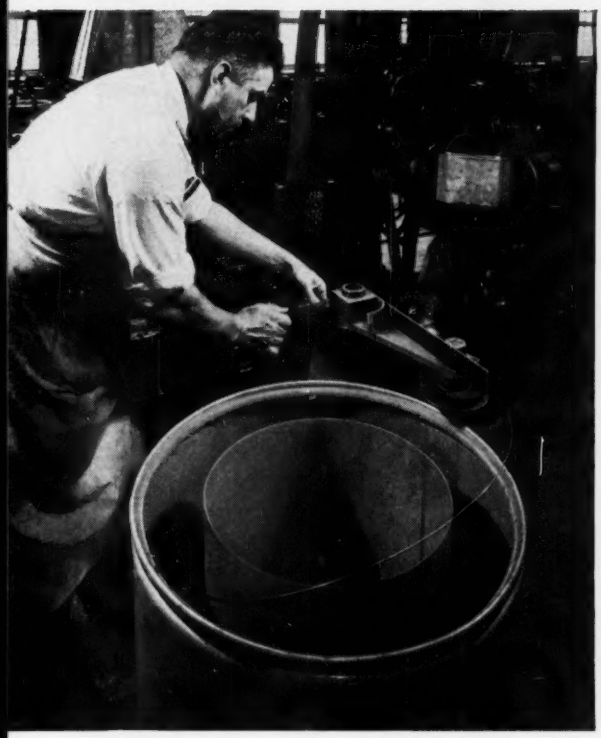
SOLUTION

2. "CF&I Fibre Drums are an ideal answer to the problem of unclean wire. The sturdy Fibre Drum has a metal cover and locking band which seals the drum, protecting the wire from grime and from corrosive elements. In addition, Fibre Drums hold up to 600 lbs. of one continuous length of wire which enables us to run our machines for a longer time than when we used small coils."

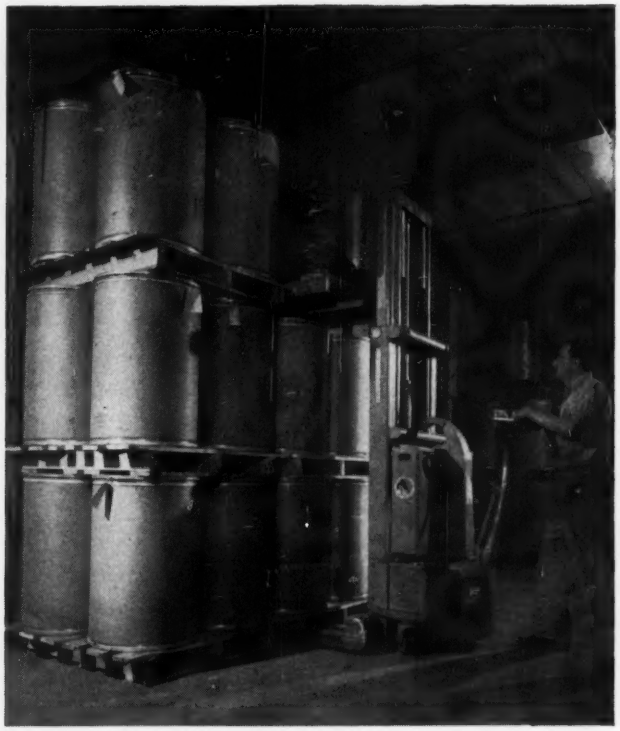
Stem-paks and Fibre Drums are just two of nine wire packages that CF&I offers to help make your operation more efficient and economical. When you order from

INCREASE PRODUCTION 12½%

at Risdon Manufacturing Co., Waterbury, Conn.



Risdon Mfg. Co. also uses CF&I Fibre Drums, which hold up to 600 lbs. of wire, for special operations. The sealed Fibre Drums protect the wire against rust and contamination during transit and in-plant storage. Note how closely the Fibre Drums can be placed to the machine and how evenly the wire pays off.



A Stem-pak is easily placed in storage alongside Fibre Drums. No messy storage problems... no chance of coils becoming tangled. Inventory of this neat, compact storage set-up is a quick, simple counting job.

CF&I, you can specify wire *packaged for your production* to give you one or more of these benefits:

- **less downtime through extra-long continuous lengths of wire**
- **compact storage and simplified inventory control**
- **fast unloading and in-plant handling**
- **assured cleanliness of the wire**
- **smooth pay off of the wire**

A CF&I salesman will be glad to assist in selecting the *right* wire package for your operation. There's no charge for this service, so call our nearest sales office today.

CF&I-WICKWIRE WIRE

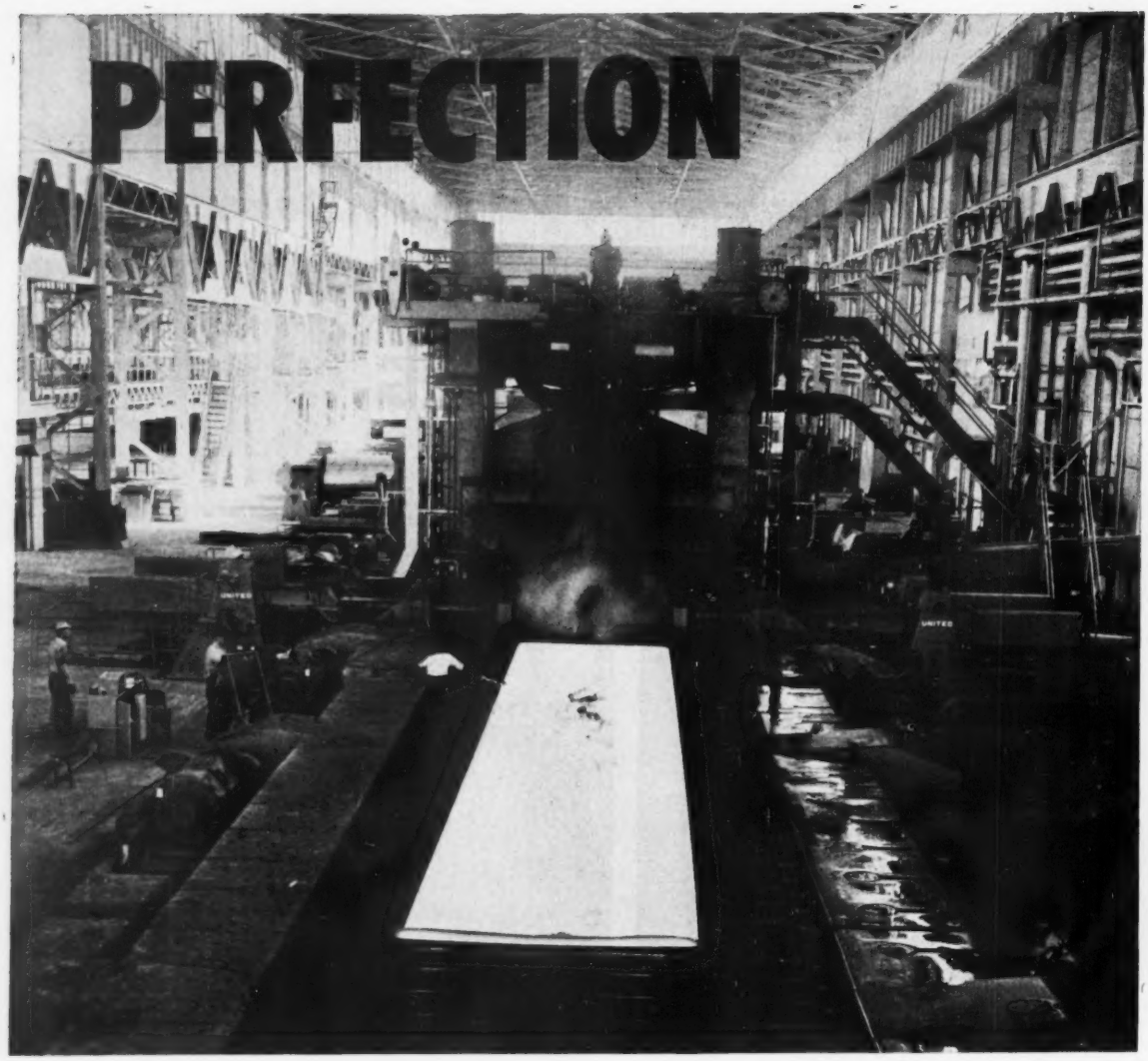
THE COLORADO FUEL AND IRON CORPORATION

CF&I STEEL

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Wichita

In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

CF&I OFFICE IN CANADA: Montreal • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg 7021



Fuji's modern 160" plate mill

From Pig to Finished Products

FUJI IRON & STEEL CO., LTD., a giant among Asia's steelmakers, has made vast strides towards achievement of perfection in all phases of iron and steel production. FUJI STEEL products can be depended upon because rigid control is maintained over quality at all essential points.

FUJI IRON & STEEL CO., LTD.

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European Office
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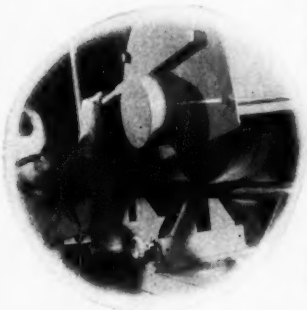
Germany

For Speed and Mileage...

use Resinall METALITE® Flap Wheels



RESINALL tells you that maximum heat resistance is built-in . . . RESINALL products are doubly anchored, with an all-resin bond that holds the needle sharp abrasive grains to the backing, in addition to the resin bond sizing coat. This means the highest rate of cut, faster stock removal and greater mileage.

Speed polishing stainless tubing or intricate shapes . . . RESINALL METALITE Flap Wheels are increasing production and cutting costs. Investigate this fast, efficient, new metalworking tool.

BEHR-MANNING CO.

TROY, NEW YORK

A DIVISION OF NORTON COMPANY

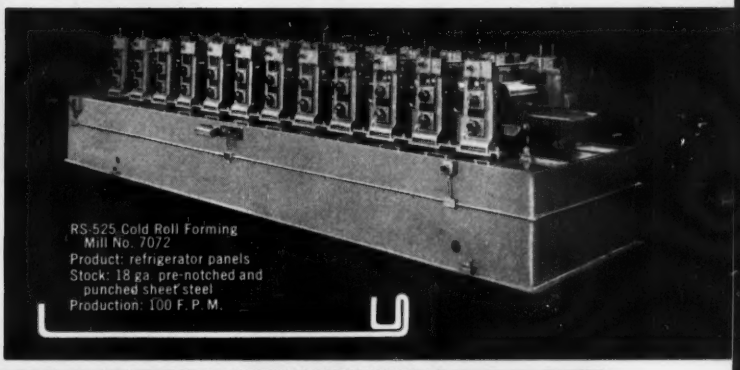
NORTON ABRASIVES®

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
In Canada: Behr-Manning (Canada) Ltd., Brantford. For Export: Norton Behr-Manning Overseas Inc., Troy, N. Y., U.S.A.

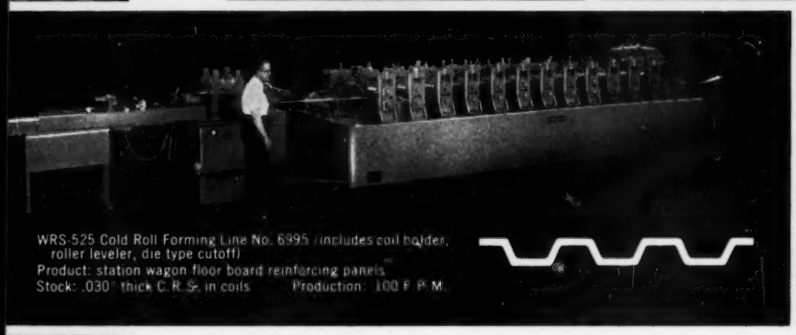
Roll forming upswing.....

Recently installed in the plant of one of America's leading steel companies was this McKay cold roll forming line for the forming and cutting to length of industrial shelving angles up to .116" mild steel strip with pre-notched holes for joining. Line is composed of double rotating coil holder, roller leveler, pre-notching press, forming machine, cut-off, run-out and kick-off table.

Completely Automatic Rim Rolling Line No. 6798
Product: automobile and farm implement drop center wheel rims
Stock: welded steel bands
Production: 600-900 Rims per hour



RS-525 Cold Roll Forming Mill No. 7072
Product: refrigerator panels
Stock: 18 ga. pre-notched and punched sheet steel
Production: 100 F. P. M.



WRS-525 Cold Roll Forming Line No. 6995 (includes coil holder, roller leveler, die type cutoff)
Product: station wagon floor board reinforcing panels
Stock: .030" thick C. R. S. in coils Production: 100 F. P. M.

WRS-653 Cold Roll Forming Line No. 7229 (4) (includes coil holder, roller leveler, die type cutoff)
Product: bar joist channels
Stock: ⅛" to ¼" thick h.r. low-carbon steel in coils
Production: 100 F. P. M.

WRS-420 Cold Roll Forming Line No. 7118 (includes coil holder, roller leveler, pre-notching press, die type cutoff)
Product: structural angles and channels
Stock: 16 ga. to 11 ga. h.r. and c.r. low C steel in coils
Production: 100 F. P. M.

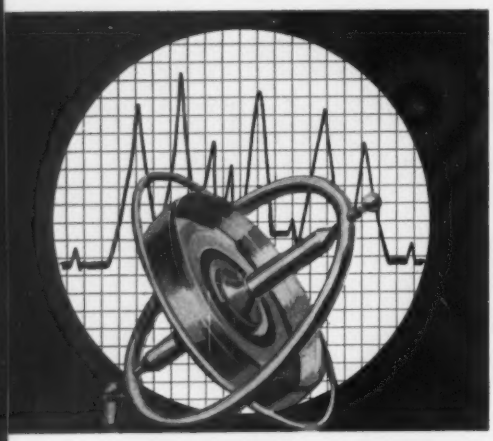
Manufacturers of all kinds of products look to McKay Machine for roll forming equipment to lower man-hour costs!

To increase man-hour production, manufacturers are turning to the automated roll forming line. In recent years McKay Machine engineers have developed equipment that enables fabricators to produce more and more products in a continuous stream directly from coiled stock.

From drop center wheel rims and station wagon floor boards to finished refrigerator parts, manufacturers are finding roll forming gives them greater production control and product uniformity while eliminating many costly intermediate manufacturing functions.

Analyze your production—there may be a way you can take advantage of roll forming economies. To help you, why not rely on the 20 years of roll forming leadership of the *McKay Machine Company, Youngstown, Ohio.*

McKAY MCK MACHINE



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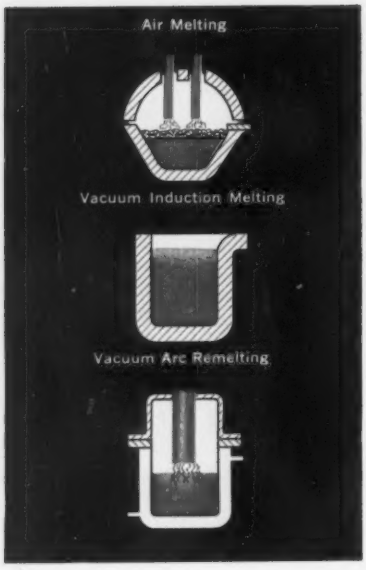


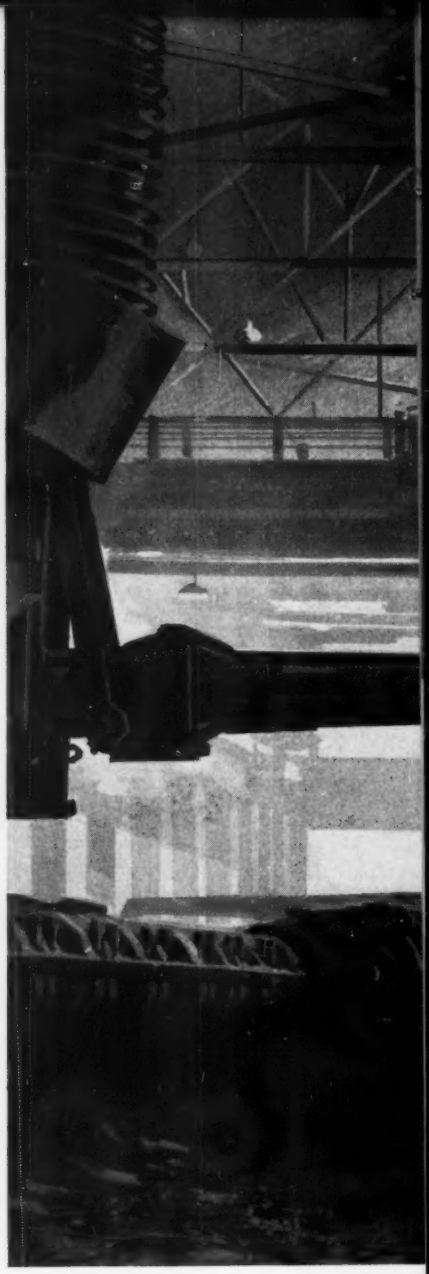
d

a. Titanium slabs are heated prior to rolling into continuous sheet coils. Crucible's increased capacity for producing high purity metals, in all sizes and mill forms, is substantially reducing costs and delivery times.

b. ***Vacuum Melted Alloys*** *are specified for gyroscope balls used in navigational and fire direction systems. The metals' improved properties facilitate miniaturization.*

c. ***Titanium*** *helium storage bottles for ICBM Atlas. Titanium, which must be vacuum melted, was selected because of its high strength weight ratio, cold-resistant properties and corrosion resistance.*

d. ***Basic Melting Processes.*** *Vacuum induction melting produces "purer" metals than conventional air melting because it eliminates all sources of contamination except the crucible. Vacuum arc remelting eliminates the crucible and permits production of ingots up to 18,000 lbs.*



VACUUM MELTING CREATES

Marked improvements in properties produced by High-Purity Metallurgy

Behind the development of space-age metals with entirely new characteristics is vacuum melting — a series of processes that produce "purer" metals with better properties.

Why Vacuum Melt? Vacuum melting protects molten metal from contact with air. It also provides closer control of composition, helps eliminate inclusions, and minimizes center porosity and segregation in ingots.

In the field of vacuum melting, Crucible's position is unique. As the leading producer of special purpose steels, Crucible's experience in high-quality steelmaking is unsurpassed. Through formerly affiliated companies, now fully integrated with it, Crucible led in the development and commercial production of vacuum-melted steels, iron, nickel, copper — and titanium. Therefore, Crucible's breadth of experience, together with its extensive facilities, places the company in the best position to provide the "super-quality" metals most suitable for any given application.

The three vacuum-melting processes — One of the Crucible processes is VIM — *vacuum induction melting.* It starts with very high-purity raw materials, produces extremely pure ingots. A second is VAR — *vacuum arc remelting,* or the consumable electrode process. This process, starting with air-melted electrodes, produces large ingots — up to 32″ diameter x 18,000 lbs. It provides

a

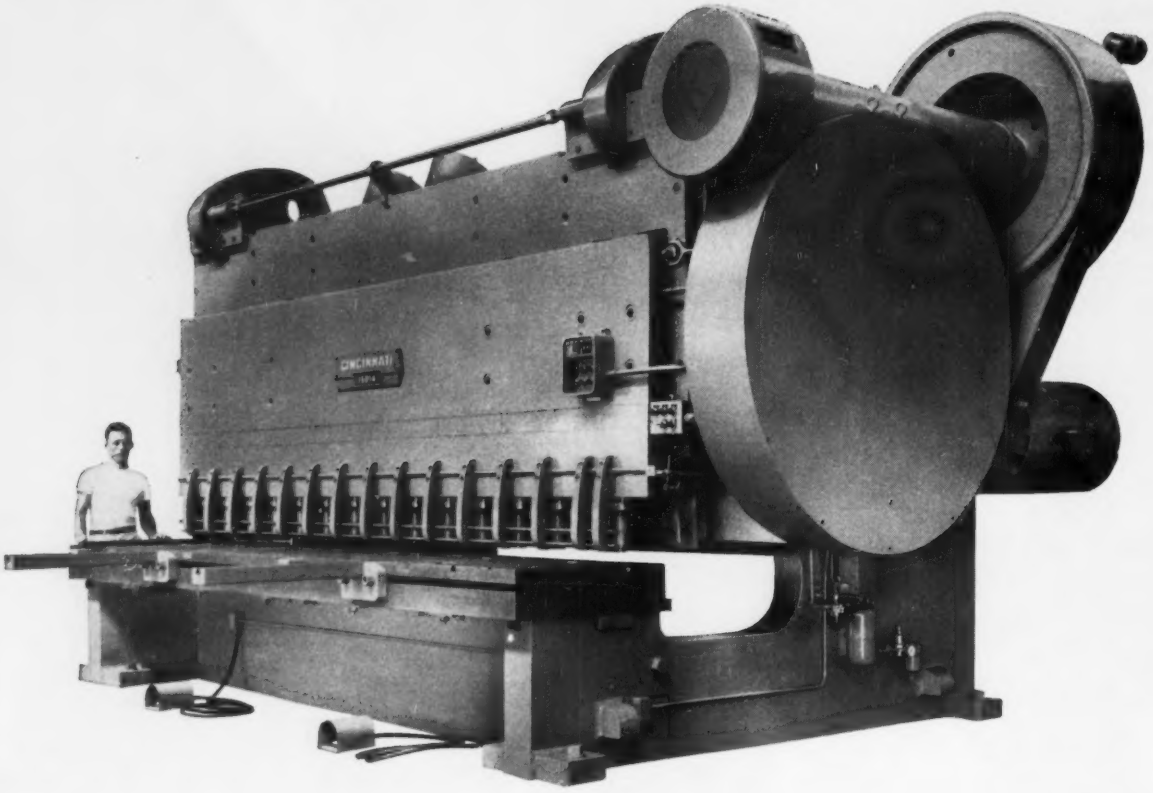
SUPER-DUTY METALS

metal with low-gas content and greatly improved uniformity of properties. The third process is VIR — *vacuum arc remelting of vacuum induction melted electrodes*—a double-melting technique. It permits manufacture of super-pure metals in the full range of ingot sizes.

Crucible's experience with all three processes, and its facilities for vacuum arc remelting its own specially air- or vacuum-melted electrodes, provides industry with a complete range of vacuum-melted metals at the lowest possible cost. Only at Crucible is there available this experience, flexibility and the facilities for vacuum-melting titanium, superalloys, heat-resisting alloys, bearing steels, tool steels, stainless steels, electronic alloys and nuclear reactor materials.

If you'd like to know more about Crucible's work in High-Purity Metallurgy, read: "Quality Aspects and Properties of Vacuum Induction Melted and Vacuum Arc Remelted Steels and Super Alloys" and "Titanium for Aircraft and Spacecraft". Write: *Crucible Steel Company of America, Dept. AL-15, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE STEEL COMPANY OF AMERICA



This CINCINNATI® shears mild steel plate

1¼ in. thick X 14 ft. long

This 15014 Series Cincinnati All-Steel Shear has a 36″ gap and a 48″ back gage range.

Power for heavy cutting with accuracy and operating convenience are combined in this machine.

Modern features such as—hydraulic holddowns, front operated power back gage, hinged back gage angle, automatic pressure lubrication, all-steel interlocked construction, forged alloy steel eccentric shaft—all contribute to an outstanding performance with low maintenance and high accuracy.

See your Cincinnati representative on heavy or light shearing applications. Write for catalog S-7R.

Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio, U.S.A.

Are You Getting What You Pay For?

When you pay for HIGH QUALITY high-carbon wire, you want to be sure you get it. You do, when it is supplied by Roebling.

It is unsurpassed in quality, consistently true to specifications, and absolutely uniform in gauge. Hundreds of manufacturers attest to this fact . . . the qualities that they *pay* for—they *get* in Roebling high-carbon wire. The length of our relationship with customers proves it.

We'll be glad to show you what we mean. For information on superior high-carbon wire or cold rolled strip, write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

This lightweight "No Charge" spool is typical of Roebling's modern packaging methods that save customers time and money.

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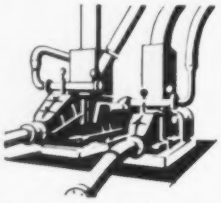
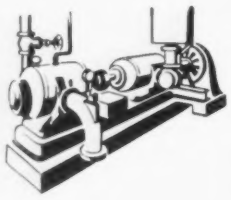
Roebling... Your Product is Better for it

FULLER EQUIPMENT

for the process industries

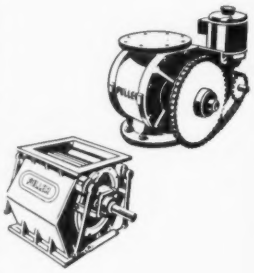


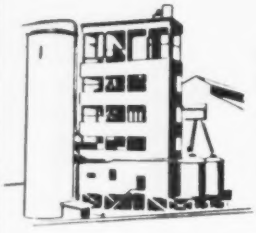
Pneumatic Materials Handling Systems. Widely specified throughout the process industries, Fuller's range of equipment offers best single source for solving problems in moving dry bulk materials pneumatically. Fuller-Kinyon Pumping Systems, Airveyor® Pressure and Vacuum Conveying Systems, and F-H Airslide® Fluidizing Conveyors are completely sealed to prevent both contamination of the product and any leakage of dust, etc., into the surrounding area. They are used to move dry, granular and pulverized materials to and from cars, ships, trailers, storage and processing points.



Fuller Rotary Compressors and Vacuum Pumps are vibration-free, can be installed anywhere, even on balconies. Fewer moving parts mean minimum maintenance. Compressors and Vacuum Pumps handle air and gases from 30 to 3300 cfm at pressures to 125 lb. gage. Vacuums to 29.95 in. (referred to 30-in. barometer).

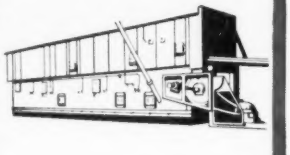
Fuller Vane-type and Roll Feeders . . . for volumetrically controlled feeding of a wide range of dry pulverized or granular materials. Also Fuller Rotary Valves . . . used under silo deck slabs and bins to permit the free flow of pulverized materials which tend to arch, such as lime and cement raw materials.





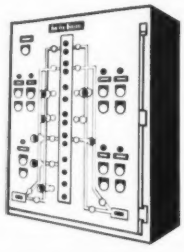
Fuller Preheaters, Humboldt Suspension Type . . . for preheating dry, pulverized Portland cement raw materials with rotary kiln waste gases.

Fuller Horizontal and Inclined Grate Coolers are compact, easily installed for fast, efficient cooling of materials such as nodulized phosphate rock, pebble lime, ores, dolomite, iron nodules and Portland cement clinker from 2800°F. or higher to any desired point within a reasonable range of atmospheric temperature.



Fuller-Material-Level Indicators signal audibly and visibly when materials reach a predetermined high or low level. Controls conveyor motors, valve circuits, etc.

Fuller Control Panels permit automatic, remote, one-man control of multiple operations. Easily-read panel permits visualizing flow of material to storage or from process bins.



Fuller equipment is designed to help give you maximum efficiency at minimum cost. Send today for more detailed literature.

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FULLER COMPANY
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Subsidiary of General American Transportation Corporation
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Fuller
. . . . pioneers in harnessing AIR

Cleaner, cooler operation . . . less maintenance . . . longer, trouble-free life

HERE'S WHY: Ordinary d-c motor ventilation systems draw air in at the commutator end, contaminate windings by drawing carbon dust from commutator brush wear *into* the machine. In the new Life-Line* "H," this air flow is reversed. Air and carbon dust are expelled at commutator end . . . assuring cleaner, cooler windings . . . longer motor life . . . less maintenance.

Plus . . . these other important advantages .....

YOU CAN BE SURE...IF IT'S Westinghouse

These exclusive features of the new Westinghouse Life-Line "H" d-c motor guarantee top performance . . . longer, trouble-free life

TEN TIMES LONGER INSULATION LIFE . . . New silicone insulation in Westinghouse Life-Line* "H" d-c motors and generators stands up under temperatures which turn ordinary insulation to a cinder. High-temperature silicone insulation is used with the full complement of iron and copper required for low Class B temperature. Result: Life-Line "H" shrugs off emergency overloads and abnormal ambients to keep production rolling, maintenance down.

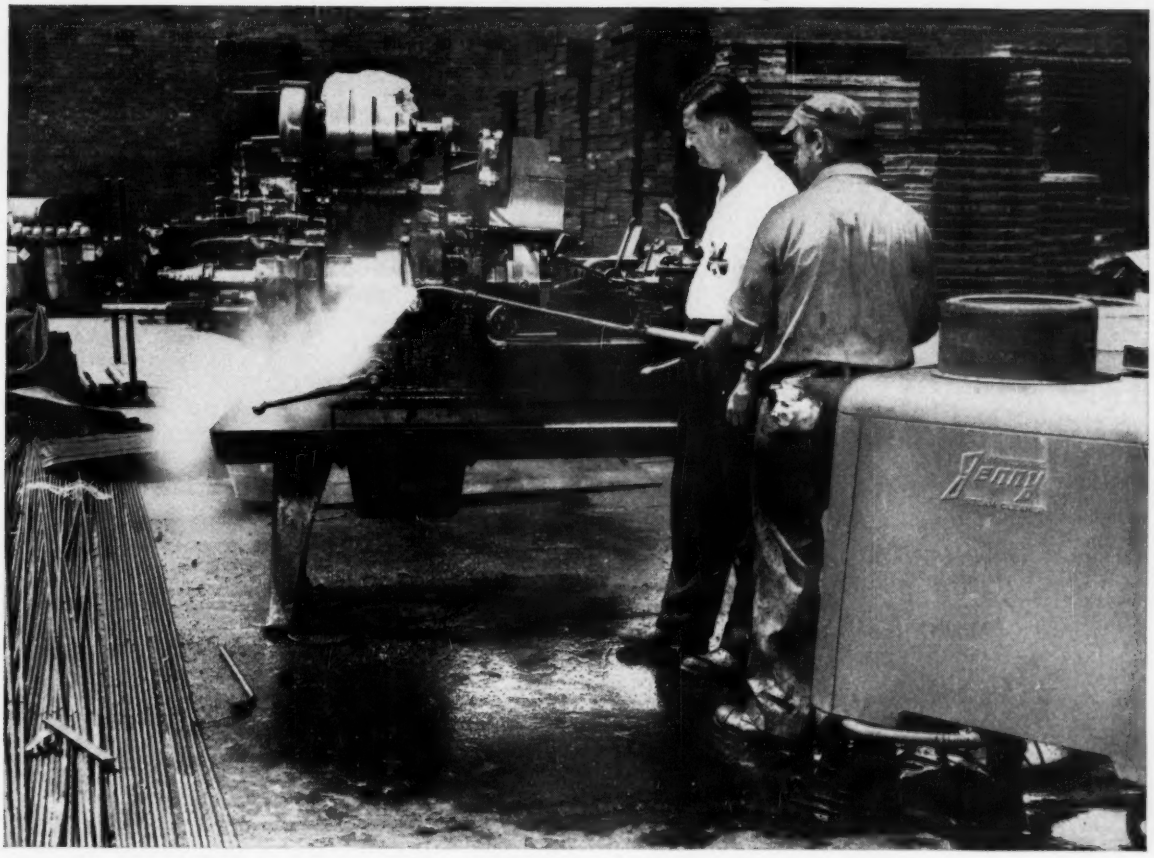
GREATER PROTECTION . . . most complete and advanced protection available in dripproof industrial d-c machines. Elimination of uncovered side openings . . . heavy, cast end brackets . . . effective seals throughout . . . all combine to provide outstanding resistance to liquids, vapors and dirt. This means longer life with greater reliability . . . minimum maintenance under all operating conditions.

FASTEST RESPONSE . . . 35 per cent increase in commutating ability . . . up to 55 per cent lower mechanical inertia . . . and up to 30 per cent reduction in electrical inertia mean that the new Westinghouse Life-Line "H" d-c motor provides the fastest acceleration, quickest reversing and closest speed regulation. This means more production, better product quality, minimum complexity of control.

SIMPLIFIED MAINTENANCE . . . With the new Life-Line "H," maintenance is not only substantially reduced but periodic inspections are also greatly simplified. For example: as shown above, Uniforce brushholder fingers lock out . . . brushes can be inspected or changed with one hand. And Uniforce tension remains constant throughout brush life . . . no need to adjust pressure as brushes wear.

For information about the ways you can profitably put the new Life-Line "H" motor to work, contact your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa. J1-22122

YOU CAN BE SURE...IF IT'S Westinghouse



Jenny® Removes 25 Years of Grime– Slashes Tool Reconditioning Time!

To remove 25 years' accumulation of dirt, grime, and grease from 200 metal working and forming tools, was the problem faced by Mr. John Radzak, Production Manager, Universal Form Clamp Co., Chicago. After trying numerous methods, Hypressure Jenny Steam Cleaner was chosen as the most thorough and economical means of doing the job.

Typical of Jenny's speed and savings was the fact that it cleaned a 100-ton punch press in six hours, as compared with 10 man-days required previously by hand-cleaning methods.

Now, Jenny is used in the company's plant housekeeping program, and it has helped to establish them as one of the cleanest and safest plants in the country.

It will pay you well in profits, production and worker morale to make Jenny the keystone of *your* maintenance and reconditioning programs. With a choice from more than 50 different models of Jenny, including all-electric, oil-fired, or gas-fired types, and ranging in capacity from 35 to 360 gallons per hour, you are sure to get the best Jenny for your cleaning jobs.

Mail the coupon today for additional facts or free demonstration. You'll be glad you did!

98

☐ Please arrange to demonstrate a Jenny.

☐ Send additional information.

Name .....Title .....

Company .....

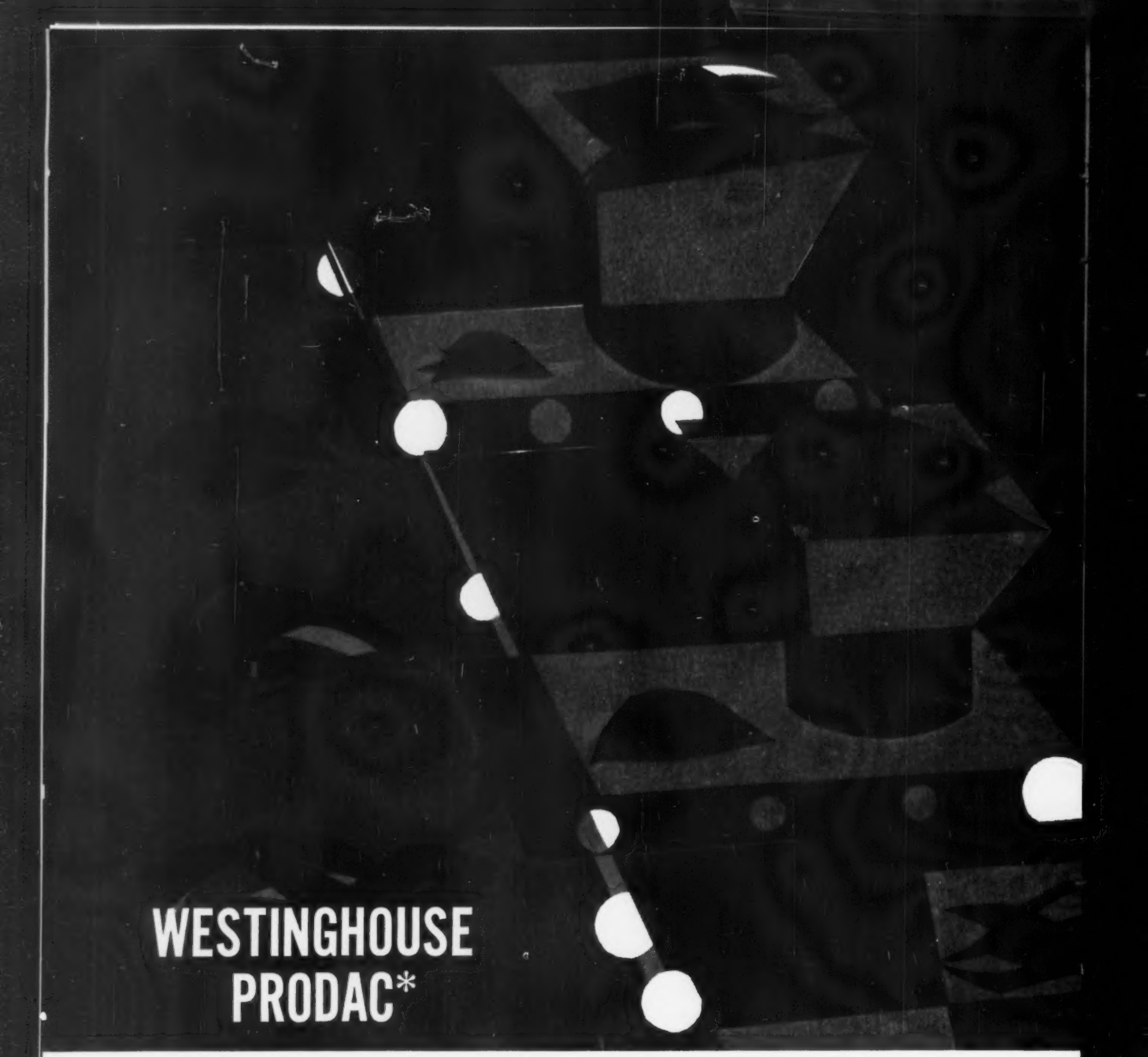
Address .....

City .....Zone.....State .....

hv

HOMESTEAD VALVE MANUFACTURING COMPANY

Hypressure Jenny Division—Coraopolis, Pa.
(In Canada: Hypressure Jenny Sales & Service, Ltd., 517 Jarvis Street, Toronto 5, Ont. C.S.A. Approved)



means automatic stocking for blast furnace charging

. . . loads and weighs stock house raw material into the skip hoist . . . delivers predetermined ingredients to furnace at the correct time and in proper sequence . . . maintains permanent record of all furnace loadings and exact time accomplished . . . then indicates when a bin needs refilling or clearing. This is but one of the many ways Westinghouse PRODAC† is helping bring about the "mill of the future" today through completely automatic stocking control for blast furnace charging.

Westinghouse has proven PRODAC installations that economically automate slabbing mills, blooming mills, reversing roughers, data accumulation systems and many other mill applications.

By specifying Westinghouse PRODAC for your mill, you open the door to many cost-saving benefits which are unobtainable with conventional controls. For example, PRODAC assures the most consistent standards of quality control at the highest rates of production speed . . . coordinates operation of all machines at the over-all maximum efficiency . . . holds maintenance to a minimum and practically eliminates control failures . . . gives you a "building block" design which provides flexibility required for further mill automation.

The entire team of Westinghouse PRODAC engineers is at your service to help you determine exactly where and how PRODAC can benefit you. Your Westinghouse sales engineer can give you complete information, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-22125

*PROGRAMMED DIGITAL AUTOMATIC CONTROL
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WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

SHAPE OF THE MONTH

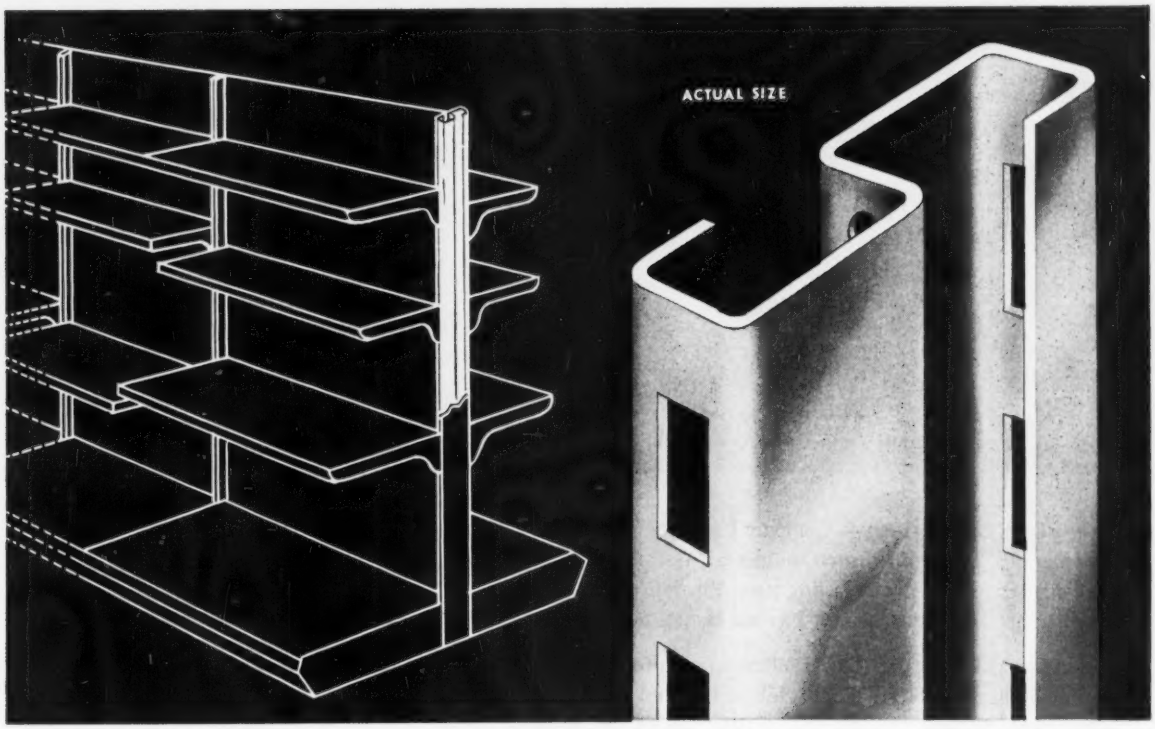
BY

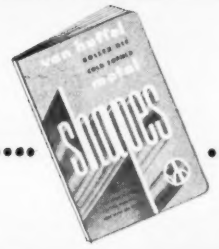
VAN HUFFEL

Where ideas *take shape*

This upright shelving post is another of the many ideas Van Huffel roller die, cold forms in metal for a wide variety of applications.

Whether you require a simple or complex shape — in practically any coiled strip metal ½" to 33" wide — want it punched, notched, seamed, fluted, beveled, welded, coiled, curved or embossed — it's probable Van Huffel's experience, facilities and products can help you cut costs and make a better product. The handbook shown below tells you how.





MAIL THE COUPON FOR FREE METAL SHAPES HANDBOOK

Contains 48 pages of information on material selection, fabrication methods, tolerances and dozens of illustrated ideas that have taken shape in metal.

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Company .....

Address .....

City ..... Zone.... State.....

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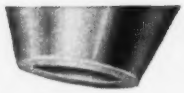
TUBE CORPORATION • WARREN, OHIO

ROLLER DIE, COLD FORMING METAL SHAPES AND TUBING FOR OVER HALF A CENTURY

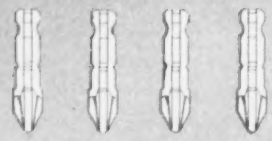
Count on *Continental* for this

2-way saving in bit costs



HY-PRO

You get 4 HY-PRO PHILLIPS Insert Bits



for the cost of 1

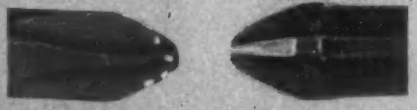
conventional bit

HY-PRO PHILLIPS Insert Bits cost only about one-fourth as much as solid bits, and there is no extra expense for re-sharpening. When a HY-PRO bit wears out, you simply replace it with a new bit . . . and restore *full* driving efficiency at negligible cost.

POWER BIT HOLDERS
made in types and sizes to fit all driving tools

HY-PRO PHILLIPS Insert Bits are FORGED

Tested and proved to
outlast other bits 2 to 1



Best comparable bit — HY-PRO Phillips Bit
Each bit drove the same number of screws

High strength *forged* HY-PRO Bits are production tested and proved to have an average service life *double* that of the best comparable bits. Many users report even greater margins of extra life for HY-PRO bits, often as high as 4 to 1.

Make your own tests— Compare bit life on your toughest driving jobs. Figure *all* costs. Continental Assembly Specialists will cooperate fully in conducting tests. You'll find HY-PRO Insert Bits and Holders your best buy for lasting bit economy.

Precision control with the same Phillips master tools assures uniformly accurate fit of HY-PRO Phillips Bits and HOLTITE Phillips Screw recesses. Use this proved combination for the top efficiency you need in assembly — especially with power and automatic driving equipment — to avoid downtime, rejects, and weak fastenings. For full information, write: Continental Screw Co., 462 Mt. Pleasant St., New Bedford, Mass.

Only CONTINENTAL makes BOTH PHILLIPS SCREWS and PHILLIPS BITS

MEMBER SCREW RESEARCH ASSOCIATION

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HOLTITE FASTENERS

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WOOD • MACHINE • TAPPING
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INSERT BITS AND HOLDERS

HY-PRO TOOL COMPANY . . . DIVISION
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Here's how Olin Aluminum can help you get more extrusions for your dollar. We make aluminum — so we're thoroughly acquainted with the properties of all extrusion alloys. We're also experts in extrusion design and the related art of die-making. Combining this overall knowledge, we can help you achieve extrusions that use a minimum of metal with a maximum of efficiency.

Come to us with an idea of what you want to accomplish and we'll show you how to do it best — whether it involves standard extrusions or elaborate, special-purpose, multi-port dies such as that used to produce the trademark extrusion illustrated.

And you can count on quality, too! For Olin Aluminum, as a primary producer of aluminum, tests its metal at every stage of the production process . . . using such advanced methods as quantometric analysis.

Moreover, your source of supply is assured by this fact: every Olin Aluminum customer is the terminal point of a massive, unbroken chain of supply that extends from the bauxite mine to the extrusion press.

OLIN ALUMINUM®

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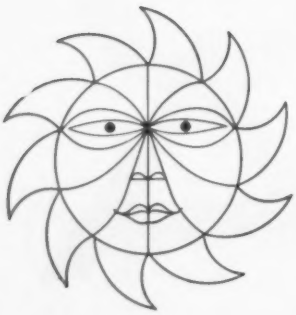

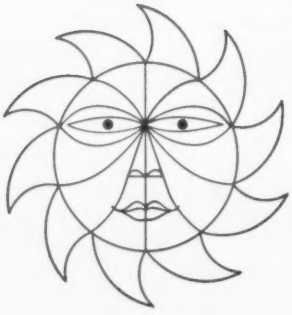

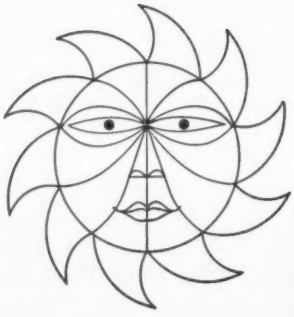

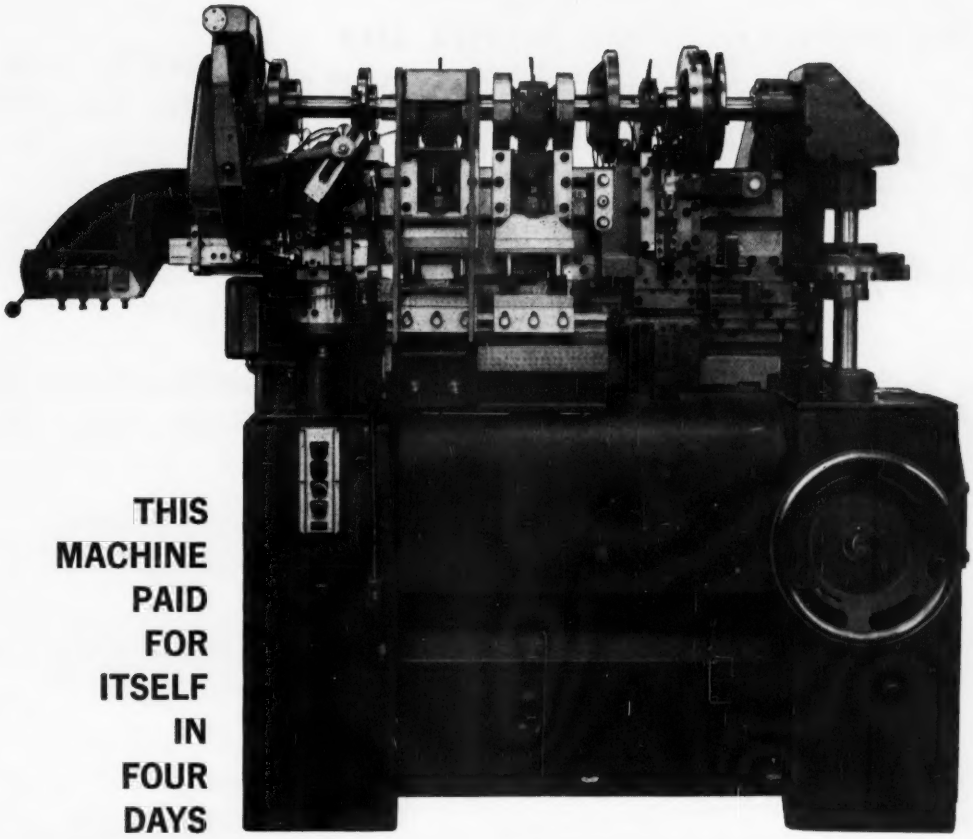

THIS MACHINE PAID FOR ITSELF IN FOUR DAYS

The high-precision enameling wiper die shown below, has 26 critical dimensions. Previous production methods at the General Electric Industrial Heating Department employed either 5 or 6 standard OBI presses. Today, General Electric is producing this part **FOUR TIMES AS FAST—USING ONLY ONE TORRINGTON V-82 VERTI-SLIDE—AND SAVING $13,500 ON A SINGLE PRODUCTION RUN TOTALING 3 DAYS OF OPERATION.** This amazing new vertical four-slide machine promises a genuine revolution in high speed, high-precision, low-cost production of just about everything in strip or wire that is now produced on progressively tooled forming presses or horizontal four-slide machines. Write or call today for complete technical data—or a Torrington sales engineer.

THE TORRINGTON MANUFACTURING COMPANY

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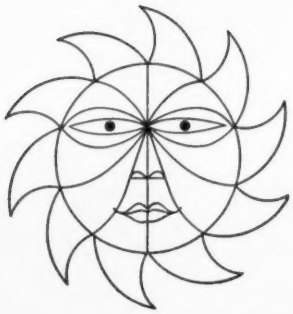
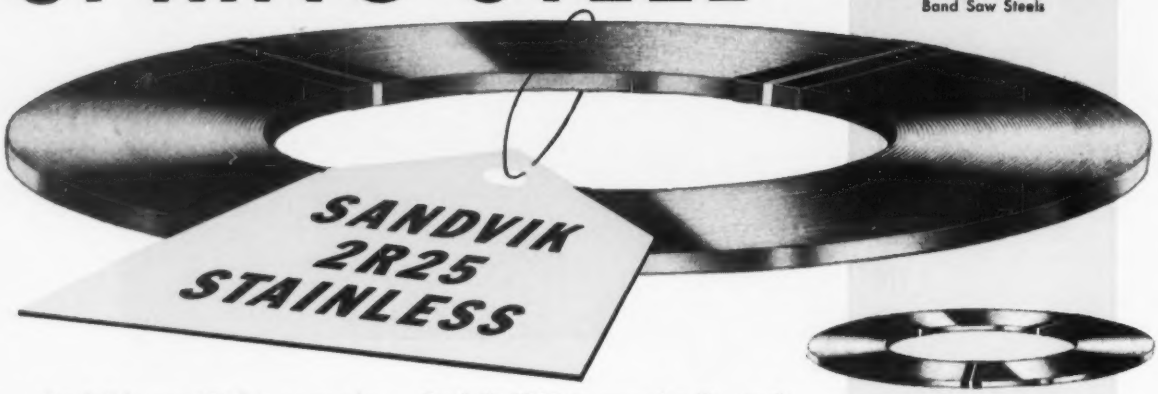


New Star Performer In The Sandvik Line

SANDVIK

Presents A SUPER SPRING STEEL



Hardened & Tempered Spring Steel

Annealed Spring Steel

Band Saw Steels

Flapper Valve Steel

Piston Ring Steels

Razor Blade Steel

Shock Absorber Steel

Sandvik's new 2R25 is a superior grade of stainless spring steel which goes far beyond the capabilities of ordinary spring steels. It was developed for applications where performance outranks cost.

This new steel is a prime example of Sandvik's ability to combine several advantageous properties in one metal.

Mechanical Data on 2R25 —

TENSILE STRENGTH RANGE — Hard Rolled 242,000 • 270,000 or 299,000 PSI
Heat Treated 270,000 • 299,000 or 327,000 PSI

ELASTIC LIMIT (.01% Proof Stress) — From 156,000 to 192,000 PSI according to size and finish

Sandvik 2R25 is exceptionally tough and resilient, much more formable than hardened and tempered steel, has up to 10 times the fatigue life of ordinary carbon spring steel and has excellent corrosion resistance under varying atmospheric conditions.

MODULUS OF ELASTICITY — 27.7 to 35.6 x 10^6 PSI according to size and finish

SIZES (with extremely close tolerances)
Thickness — .0016" to .035"
Width — .039" to 3.94"

For further information on Sandvik 2R25, contact your nearest Sandvik office

Sandvik stocks a wide variety of qualities and sizes of cold rolled specialty strip steels. In addition Sandvik has rolling, slitting, edge-filing and hardening and tempering facilities. *Send for your copy of this free brochure* which gives specific data on the leading types of Sandvik steels.

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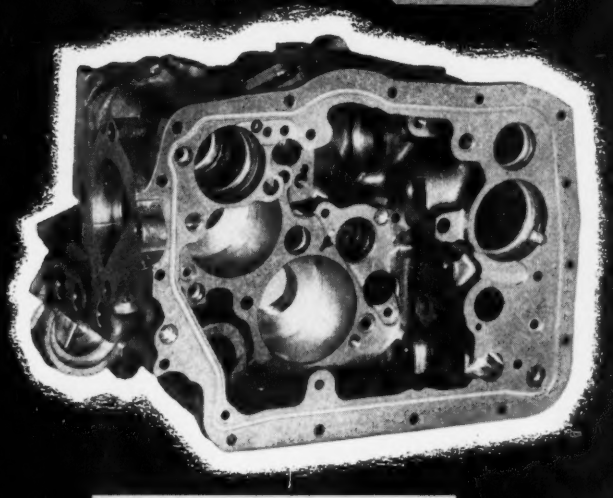
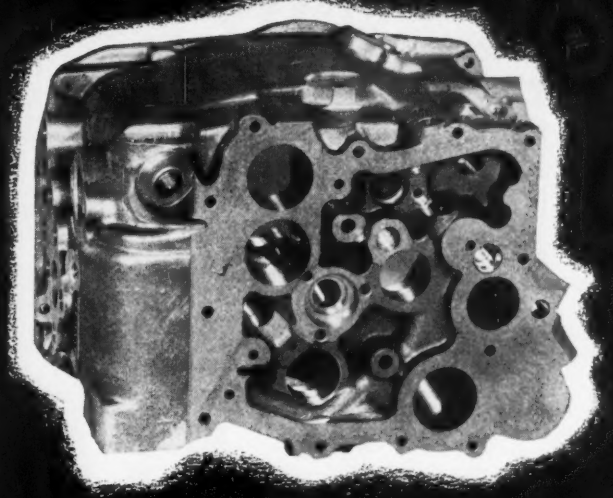
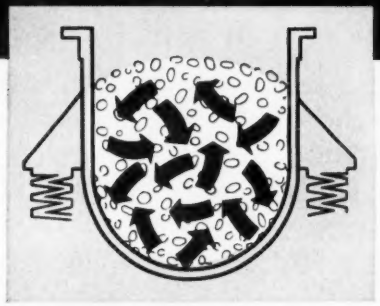
SS-178

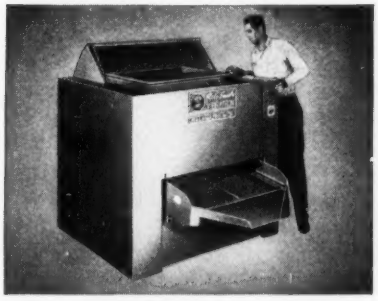
CALL ON **ROTO-FINISH RANSOHOFF** FOR *Finishing Results* LIKE THIS . . .







CONSTANT OVERALL ABRASIVE ACTION—The Vibratron work zone extends throughout the abrasive mass. Every surface is subject to constant vibrating abrasive action.



NO MORE MANUAL HANDLING of parts and media. A built-in removable separator does the job. There's no need for an extra separator.

COMPLEX ALUMINUM CASTINGS DEBURRED 2 at a time . . . in 15 minutes . . . . . the **VIBRATRON** way!

Woodward Governor Co., Rockford, Ill., long a leading manufacturer of all types of governors for prime movers, manufacture such highly precise equipment as jet engine fuel control systems. Precise finish and dimensional tolerances are a must! The fuel control shown above was previously hand deburred and then tumbled in a multiple compartment machine for 1 hour. Now . . . these cases are processed 2 *at a time in 15 minutes* in the Vibratron. No hand operation is required and the finish is more uniform.

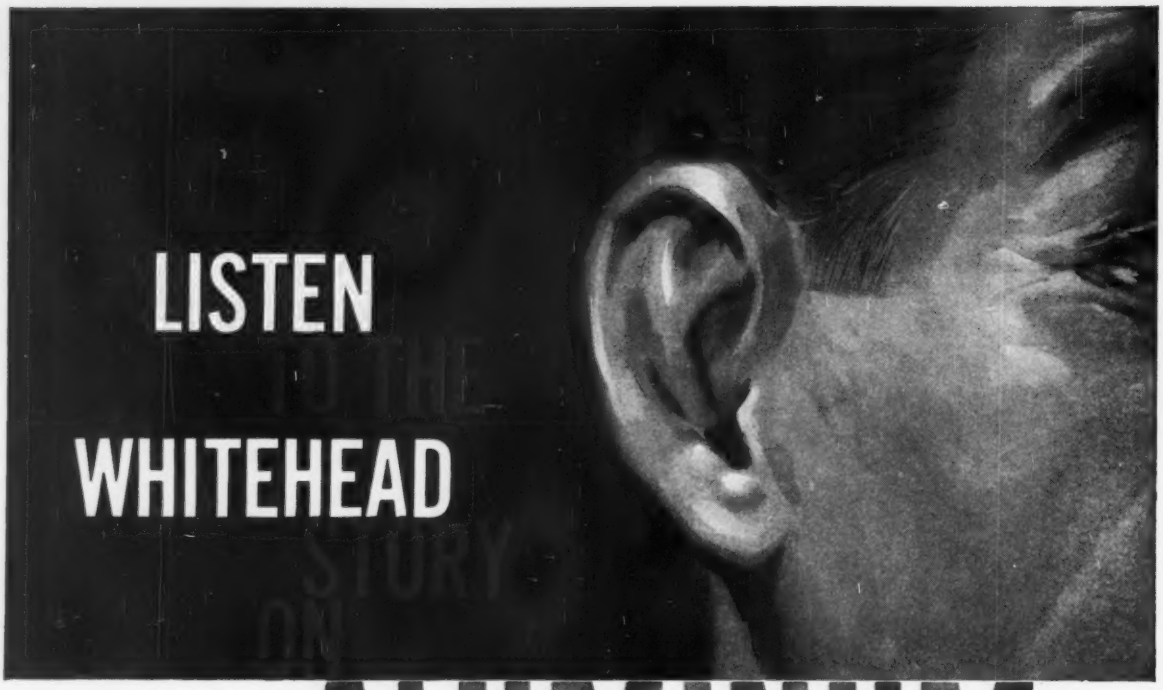
IF YOU NEED HELP ON A FINISHING PROBLEM, *Write or Phone today* FOR FULL PARTICULARS. IT WILL PAY YOU TO GET THE FACTS ON VIBRATRON PROCESSING.

ROTO FINISH

ROTO-FINISH / RANSOHOFF

3717 Milham Road, Kalamazoo, Michigan — Phone: Fl reside 3-5578

FOREIGN REPRESENTATIVES: ARGENTINA—Taller—Buenos Aires ● AUSTRALIA—A. Flavell Ltd. - Cheltenham ● BRAZIL—Commercial E. Industrial de Fornos Werco, Ltd.—Rio de Janeiro ● CANADA—Canadian Hanson & Van Winkle Co., Ltd.—Toronto ● ENGLAND—Roto-Finish Ltd. — Hemel Hempstead ● FRANCE—Societe Roto-Finish—Paris ● GERMANY, AUSTRIA, NORWAY, SWEDEN, SWITZERLAND—Metallgesellschaft A. G.—Frankfurt, a. M.—Germany ● HOLLAND, BELGIUM, LUXEMBURG—N. V. Roto Finish Maatschappij—Delft, Holland ● ITALY—Societa Roto-Finish a R. L.—Milan ● MEXICO—Enthone de Mexico, S.A. Prol Pina 669, Mexico 15, D. F. ● SPAIN—Instituto Electroquimico, S. A.—Barcelona



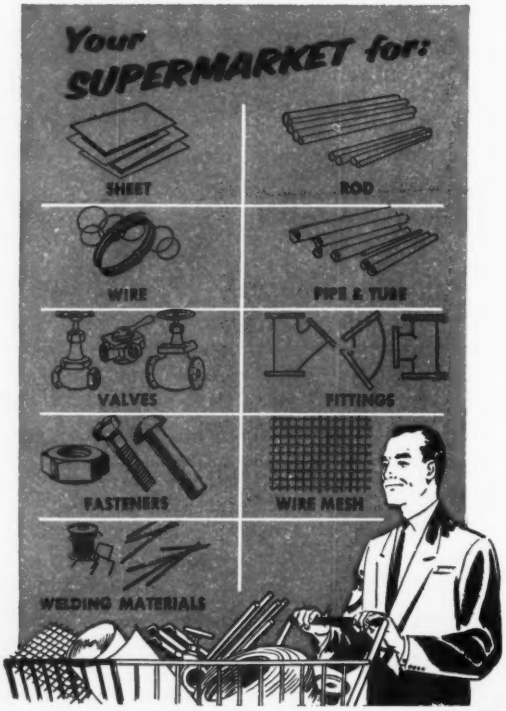
ALUMINUM

Full and complete stocks—
Technical help to meet your needs

The Whitehead service story on Aluminum is unusual. It accommodates the engineer who requires technical help in the planning stage. Then, too, the manufacturer or fabricator who requires the supplementary items—welding rod and fasteners to go with sheet; fittings and valves for the pipeline; etc. Truly a one-stop service from Alcoa's largest distributor in metals and technical help in the East.

Stocks of over 700 sizes of rod, pipe and tube; almost 500 items of sheet; thousands of fasteners and even 18 sizes of a specialty item like tool and jig plate, make Whitehead a true "Supermarket" of aluminum, no matter what your requirements.

Since we stock all the principal corrosion resistant materials—Copper Alloys, Brass, Bronze, Clad Metals, Stainless Steel, Monel, Inconel and Plastics, too—we can and do give unbiased opinions on the right material to do the job. Anytime you need anything in the corrosion resistant line, you'll find it pays to call Whitehead first.

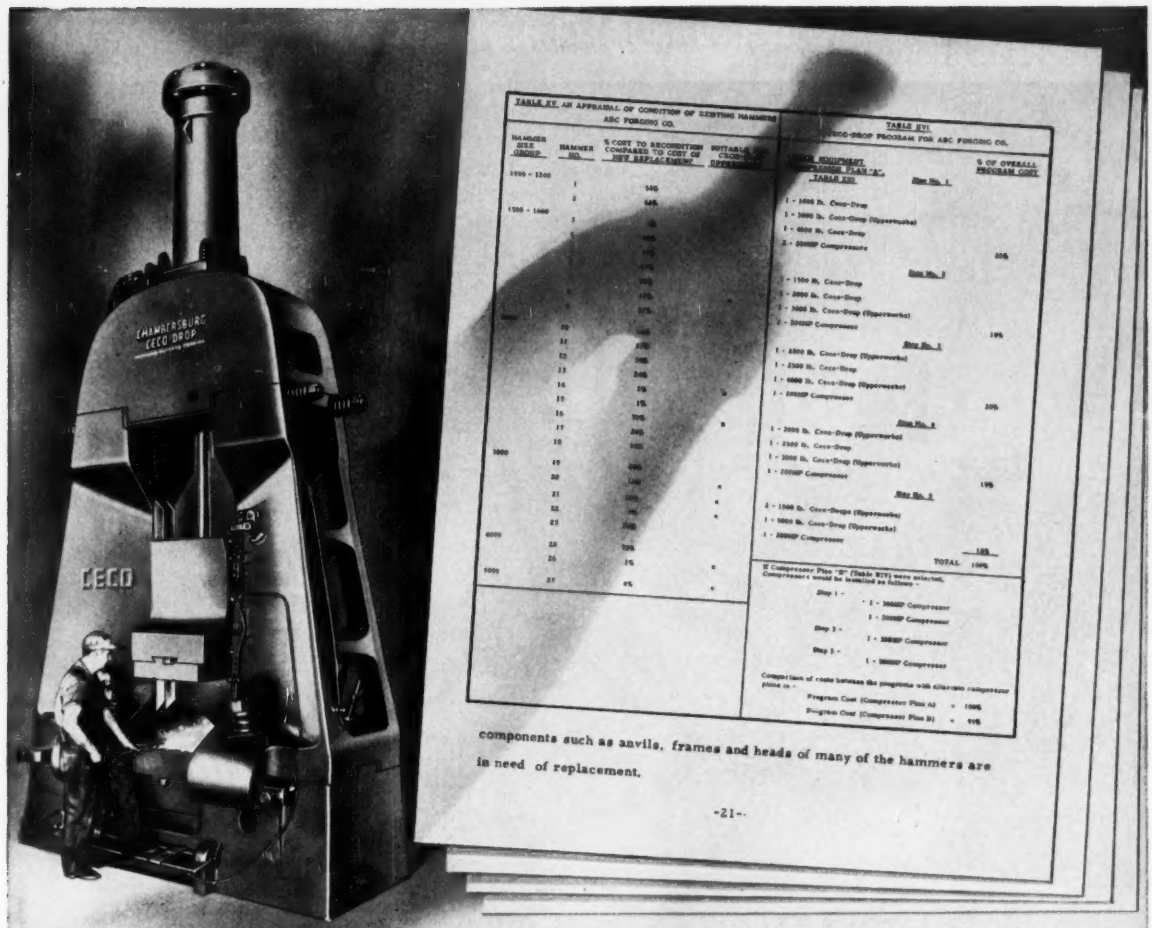


Call WHITEHEAD METALS *First!*

WHITEHEAD METALS, INC.

303 WEST 10th STREET, NEW YORK 14, N. Y.

Other offices and warehouses: **PHILADELPHIA • BUFFALO • HARRISON, N. J. • CAMBRIDGE, MASS. • SYRACUSE • BALTIMORE • ROCHESTER • WINDSOR, CONN.**



components such as anvils, frames and heads of many of the hammers are in need of replacement.

-21-

A Realistic Approach to Forge Shop Modernization

During the past few years, mounting competition has caused forge shop managers to seek ways to further increase production and reduce costs. A number have scrapped their old board hammers replacing them with Ceco-Drops, the modern piston-lift gravity-drop hammer. These shops have thus placed themselves in a position to get more business—and they are getting it! ● A wealth of helpful information is available in Chambersburg's new 28 page forge shop modernization bulletin. Based on studies made in prominent forge shops, this publication assists you to formulate your own step-by-step modernization program. Write for a copy today.

CHAMBERSBURG ENGINEERING COMPANY · · CHAMBERSBURG, PA.

SPS RELIABILITY / *A dynamic standard of predictable performance*

SPS Nuclear Division receiving inspector uses ultrasonic probe—comparable in a sense to radar—to verify absence of internal flaws in precision forging destined to become part of reactor vessel closure head in nuclear-powered submarine.

Pre-induction physical for a reactor component

Steel received by the SPS Nuclear Components Division is already a pretty sophisticated material. It comes from one of the few mills qualified to meet certain rigid Government specs. It is accompanied by a detailed affidavit of analytical tests—physical, chemical, ultrasonic, macro, intergranular, stepdown—conducted under the surveillance of both military and SPS field inspectors.

Nevertheless, the as-received material is considered by SPS to be merely a candidate for machining. New specimen slugs are cut; all tests are performed again—under the strict control of SPS laboratories, a facility unequaled in the industry. Following laboratory approval, a requirement never deviated from, the forging is serialized, assigned an individual record folder, and released to production.

And this is just the beginning. Every dimension of every part is recorded during manufacture (only SPS takes the trouble to compile this in-process data). Then when the part is finished, all records are put aside, and every dimension is rechecked—an operation that may take up to 6 hours and involve hundreds of measurements, many to ±.0005 inch.

Why these extraordinary precautions? Simply because these parts must function with absolute reliability, oftentimes in inaccessible locations. If you have requirements for such components (for reactors or for conventional power-producing machinery), contact SPS—manufacturer of precision threaded fasteners and allied products in many metals, including titanium. Request new Folder 2499.

NUCLEAR COMPONENTS Division **SPS**

JENKINTOWN 33, PENNSYLVANIA

News! The best features of
modern bearing design combined and refined in

Spherical

SELF-ALIGNING ROLLER BEARINGS BY LINK-BELT

BIG, mirror-smooth convex rollers *plus* heavy, broad-shouldered inner race *plus* centrifugally-cast bronze, precision-machined retainers! Only from Link-Belt do you get ALL that is best in modern bearing design.

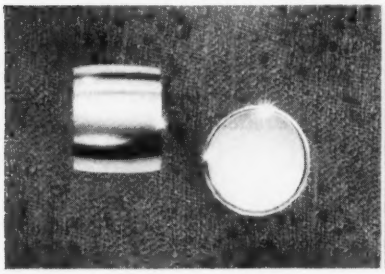
Individually, these elements represent major improvements on accepted design concepts. Collectively, they constitute the most efficient spherical roller bearings available . . . promise unequalled economies, whatever the application.

Your Link-Belt office or authorized stock-carrying distributor will gladly explain the many performance advantages evolved with this new design. And either can furnish full data on industry's most complete line of ball and roller bearings . . . pillow blocks and flanged, flanged-cartridge, cartridge and take-up blocks.

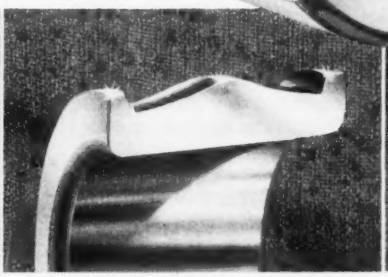
LINK-BELT

MANUFACTURERS OF SELF-ALIGNING BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. Plants, Sales Offices and Distributors in All Principal Cities. 14,819



BIG, HIGHEST-CAPACITY ROLLERS. Each bearing has a maximum number of rollers—as large as possible, yet all components are in optimum balance.



HIGH, HEAVY INNER RACE FLANGES present convenient hold for assembly and removal of bearing without cutting away shaft, avoid any need to skimp on shaft shoulders.

PRECISION-MACHINED, CENTRIFUGALLY-CAST BRONZE RETAINERS have many times more support and ability to withstand high stress. They are not stampings. Design assures maximum bearing efficiency.

By Far—Largest Supplier of Ultrasonic Cleaning Equipment to Industry

ULTRA-NEW!
ULTRASONIC!

DETREX ECONO-SONIC Unit Uses Sound Waves to Get Precision Parts Cleaner, Faster

Ultrasonic cleaning—a combination of solvent vapor degreasing and scrubbing action by high frequency sound waves—gets parts cleaner than is possible by any other method. Costs are reduced and production is increased.

The DETREX ECONO-SONIC dimensions are 24" x 14" x 29" high. This size is ideal for precision part cleaning in small to moderate sized plant operations.

With its own filter, still, pump, heater, spray lance and model 600 generator, it is a complete, self-contained cleaning system. There is nothing else to buy and it installs in minutes.

Where hyper-critical specifications exist, Detrex can supply the additional stages necessary to accomplish an in-line cleaning system. Why not write today and let a DETREX representative show you how an ECONO-SONIC unit, or a larger ultrasonic machine, can improve the quality and reduce the expense of your metal cleaning operation.

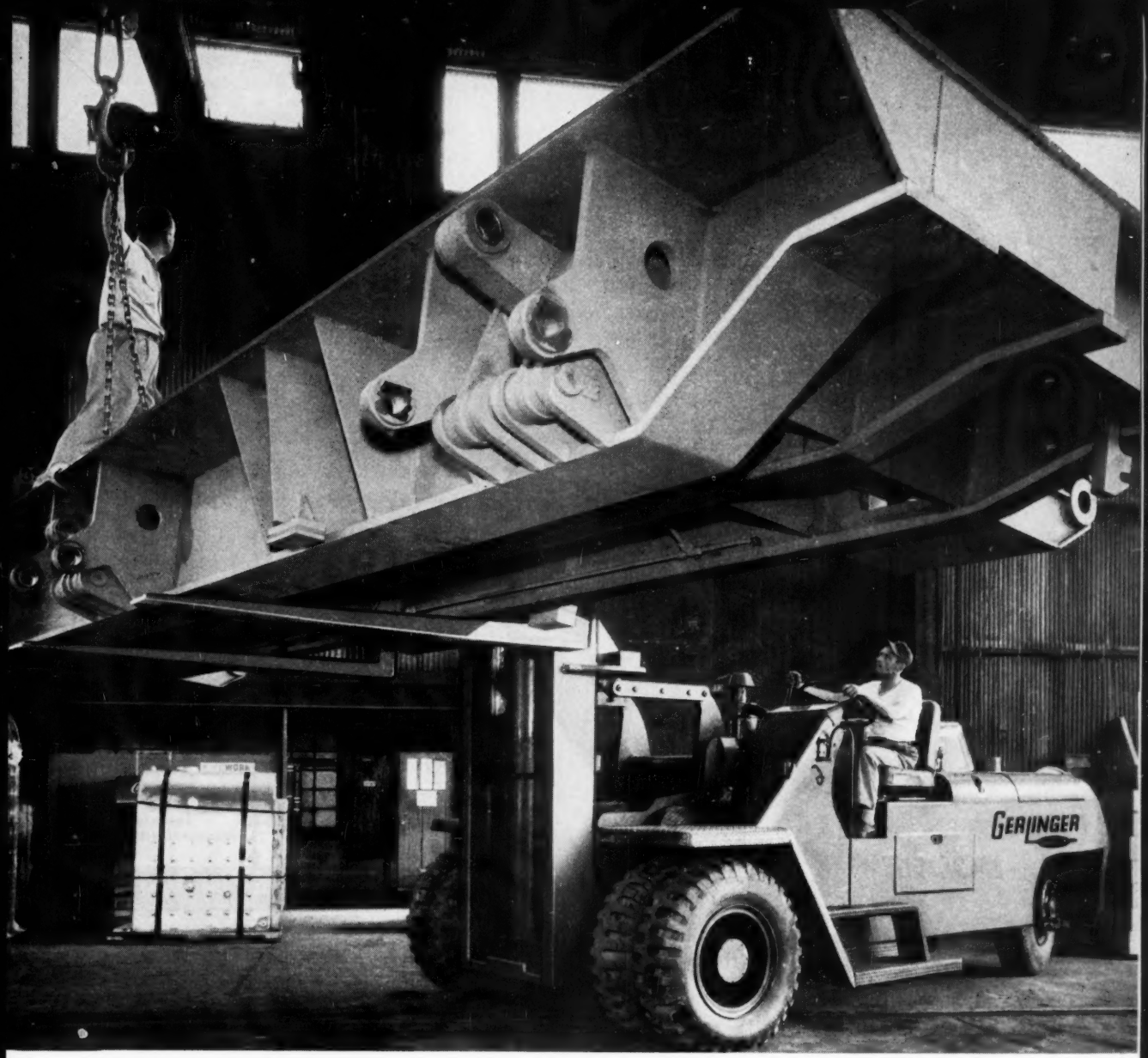
Depend on DETREX for Every Metal Cleaning and Processing Need

- PERM-A-CLOR NA (Trichlorethylene)
- Solvent Degreasers
- Ultrasonic Equipment
- Industrial Washers
- Phosphate Coating Compounds
- PAINTBOND Compounds
- Aluminum Treating Compounds
- Alkali and Emulsion Cleaners
- Rust Proofing Materials
- Extrusion and Drawing Compounds
- Spray Booth Compounds

Send for T. J. Kearney's Informative Paper on Ultrasonic Cleaning Techniques.

DETREX CHEMICAL INDUSTRIES, INC.
Box 501, Dept. S-1259, Detroit 32, Michigan

World's Largest Exclusive Producer of Cleaning Chemicals and Equipment



Savings match the load!

You're seeing a Gerlinger Fork Lift Truck showing some of the remarkable stamina and stability that causes users to say, *"Our first choice is Gerlinger for the BIG JOBS!"*

What you can't see till you own one are the tremendous savings you gain. As you move more tons per hour . . . at much less cost . . . your profits increase in proportion. *Gerlinger* offers standard gas-powered, pneumatic-tired, *Job-Proved* fork lift trucks that handle as much as 40,000 pounds per trip. (Diesel engines optional.)

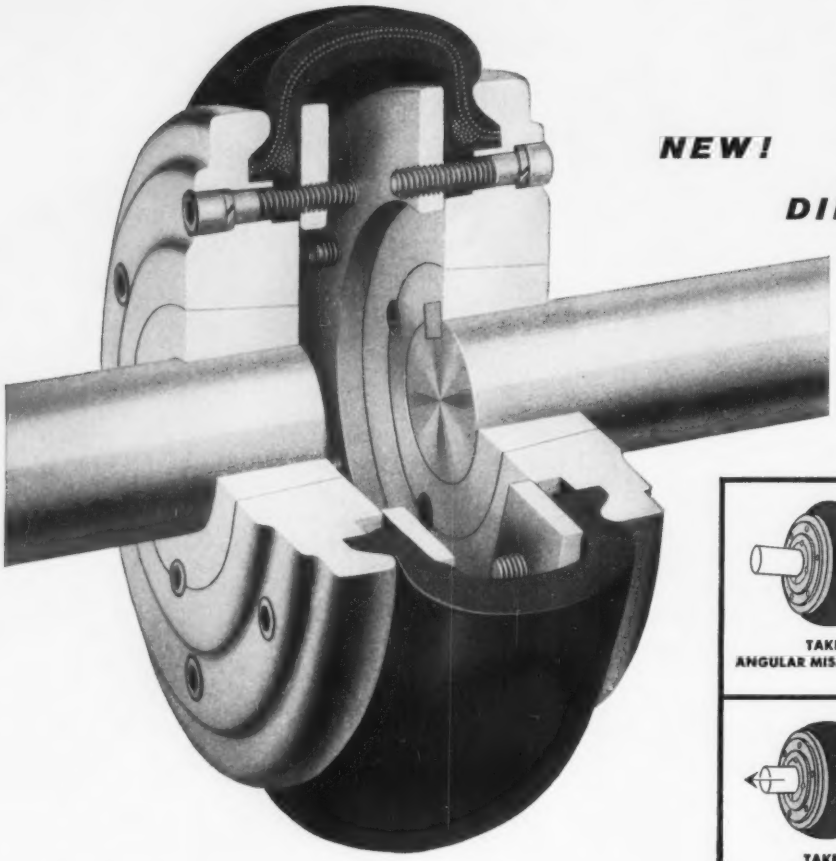
Want to see how savings match the load? Ask for Certified Job Studies covering your specific handling operations—and new Gerlinger Specifications Folder *GSS*. Write Towmotor Corporation, Cleveland 10, Ohio or Gerlinger Carrier Company, Dallas, Oregon.*

TOWMOTOR ®
THE ONE-MAN-GANG

-GERLINGER

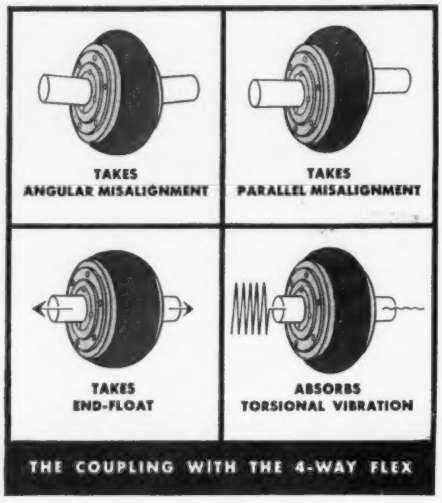
LEADERS FOR 40 YEARS IN BUILDING FORK LIFT TRUCKS, CARRIERS AND TRACTORS

*Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation



NEW!

DIFFERENT!



DODGE

Para-flex

FLEXIBLE CUSHION COUPLING

THIS coupling "swallows up" shaft misplacements. It automatically compensates for end-float, parallel misalignment, angular misalignment *or any combination of all three.* Moreover, it cushions the stresses of shock loads. And it absorbs torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.

Here is a new type of performance—made possible by the development of a tire-like flexing element. Synthetic tension members, bonded together in rubber, give this element the stamina and dependability of modern, high-speed, high-load, shock-absorbing truck tires—and the ability to respond magically to all manner of changing shaft conditions.

Para-flex takes minimum space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding parts. No lubrication is required, no periodic inspection. And since the flexible member is molded with a transverse split, it can be replaced *without moving either the driver or driven machine.*

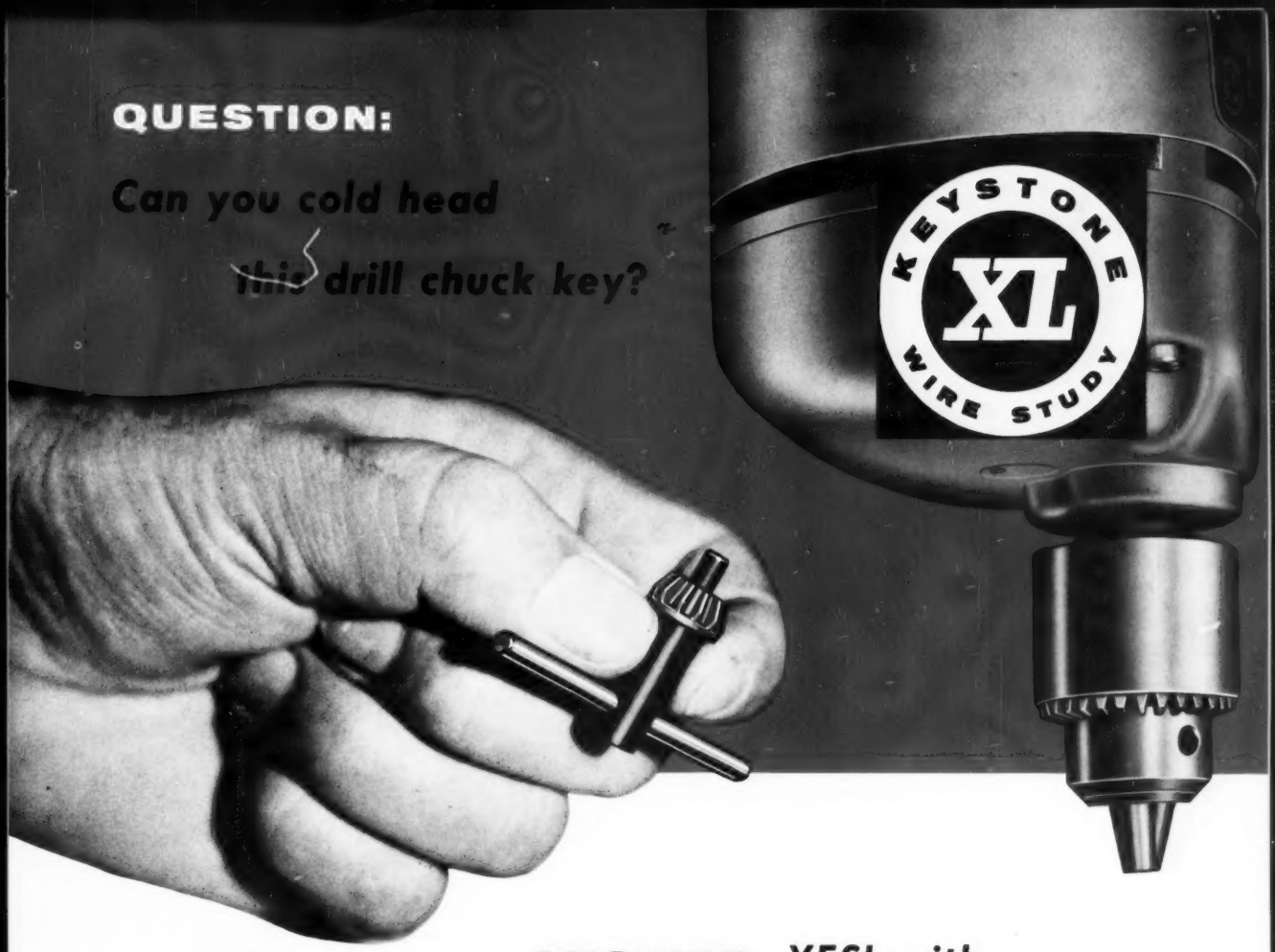
Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 2000 hp at 1080 rpm. Call your distributor for a coupling to *make your own test.* You'll witness something revolutionary!

DODGE MANUFACTURING CORPORATION, 4400 Union, Mishawaka, Ind.

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."



ANSWER: *YES! with*

CENTRAL SCREW COMPANY *engineering and KEYSTONE XL WIRE*

Questions like this are asked every day at Central Screw Co., Chicago, Ill.—and this is a typical answer! For Central Screw depends on Keystone XL Wire to head more than 7,500 stock items by the millions—and for many of its 20,000 specials. Here, as with many other progressive fastener manufacturers across the country—"know-how" combines with Keystone XL Wire quality and flowability to produce a superior product at sharply reduced costs.

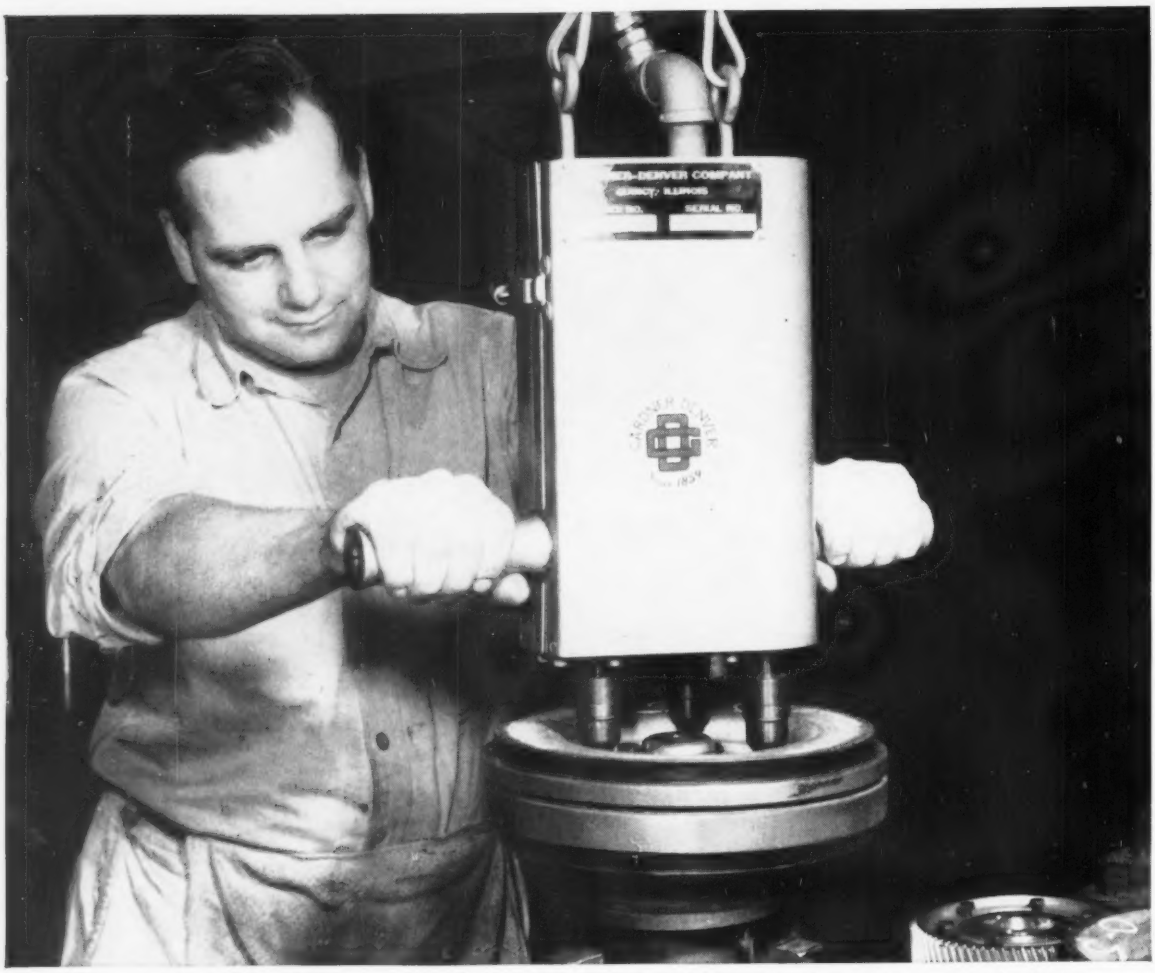
For example, by cold heading this drill chuck key, gear cutting was eliminated and machining was reduced. Overall costs were cut about 50%. This is one of *millions* of examples of how Central's "Fasteneering"® profitably puts Keystone XL Wire to use. You can do the same. Your Keystone representative will help you. Call him!

Keystone Steel & Wire Company, Peoria 7, Illinois

Five operations now produce this chuck key: heading on a 2 blow header, cut pointing, drilling, chamfering and heat treating.
ACTUAL SIZE
More Central Screw examples of Keystone XL Wire flowability are (above) this fastener with an 8 diameter thin shell head, and (right) fastener with 6½ diameters in the sharp, clean head and square shoulder.

KEYSTONE

WIRE FOR INDUSTRY



In two passes this Gardner-Denver 3-spindle multiple nut setter tightens six bolts on diesel engine flywheel.

Check this special multiple design for fast, accurate nut running

A CONSCIENCE FOR QUALITY

Gardner-Denver equipment at work throughout the world has the conscience of Gardner-Denver men behind it: designers, engineers, metallurgists, instructors, servicemen. To these men there's no substitute for quality, as at Gardner-Denver there's no substitute for men—our 100-year philosophy of growth.

Speed production, control torque with air-powered multiple nut setters—designed to do the job by Gardner-Denver. Motor units, throttle handle, dead handle, manifold—all components are specifically designed for fast, accurate multiple nut running. And all components are standardized units that can be assembled to any combination to run any number of nuts, with each nut tightened to specified torque—*all in a single operation.* Switching from job to job is quick and easy. When the bolt pattern changes, simply move the standard spindles and handles to a new job-tailored mounting plate.

Whatever your production setup—from high-volume assembly lines to low production runs—Gardner-Denver multiple nut setters speed the job . . . cut time and costs. Contact your Gardner-Denver representative for complete information.

GARDNER-DENVER Since 1859 — 100 YEARS 1959

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

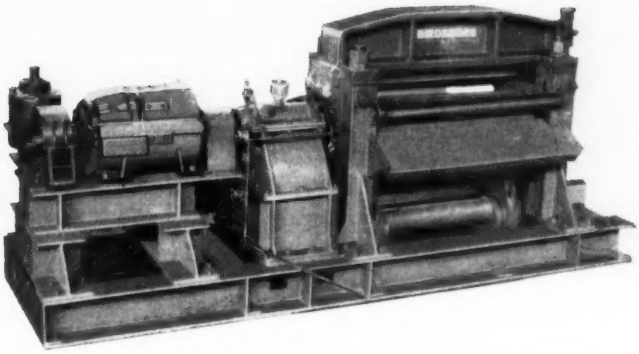
GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

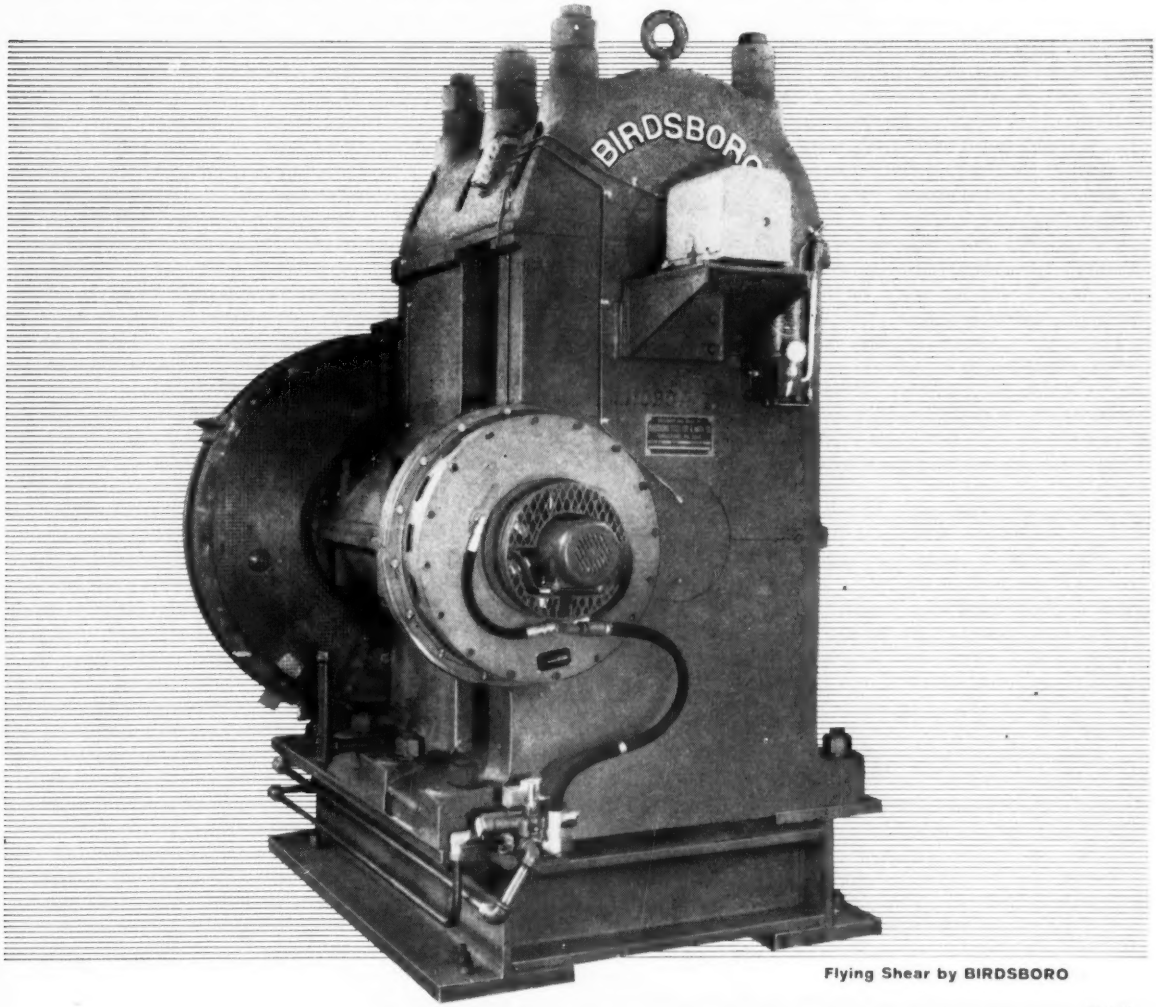
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

BIRDSBORO

Customized Shear Designs pay off in higher productivity



• Like any other key piece of mill equipment, shears have been given a lot of BIRDSBORO's attention in recent years. As a result, many innovations are available to the mill operator that can eliminate former problems and provide a finer product at a lower cost. BIRDSBORO's shear case history book is a full one. In it you can see a number of firsts, some of them applicable to your operation. The BIRDSBORO representative can help apply creative engineering to your mill. *Sales Department, Engineering Department and Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.



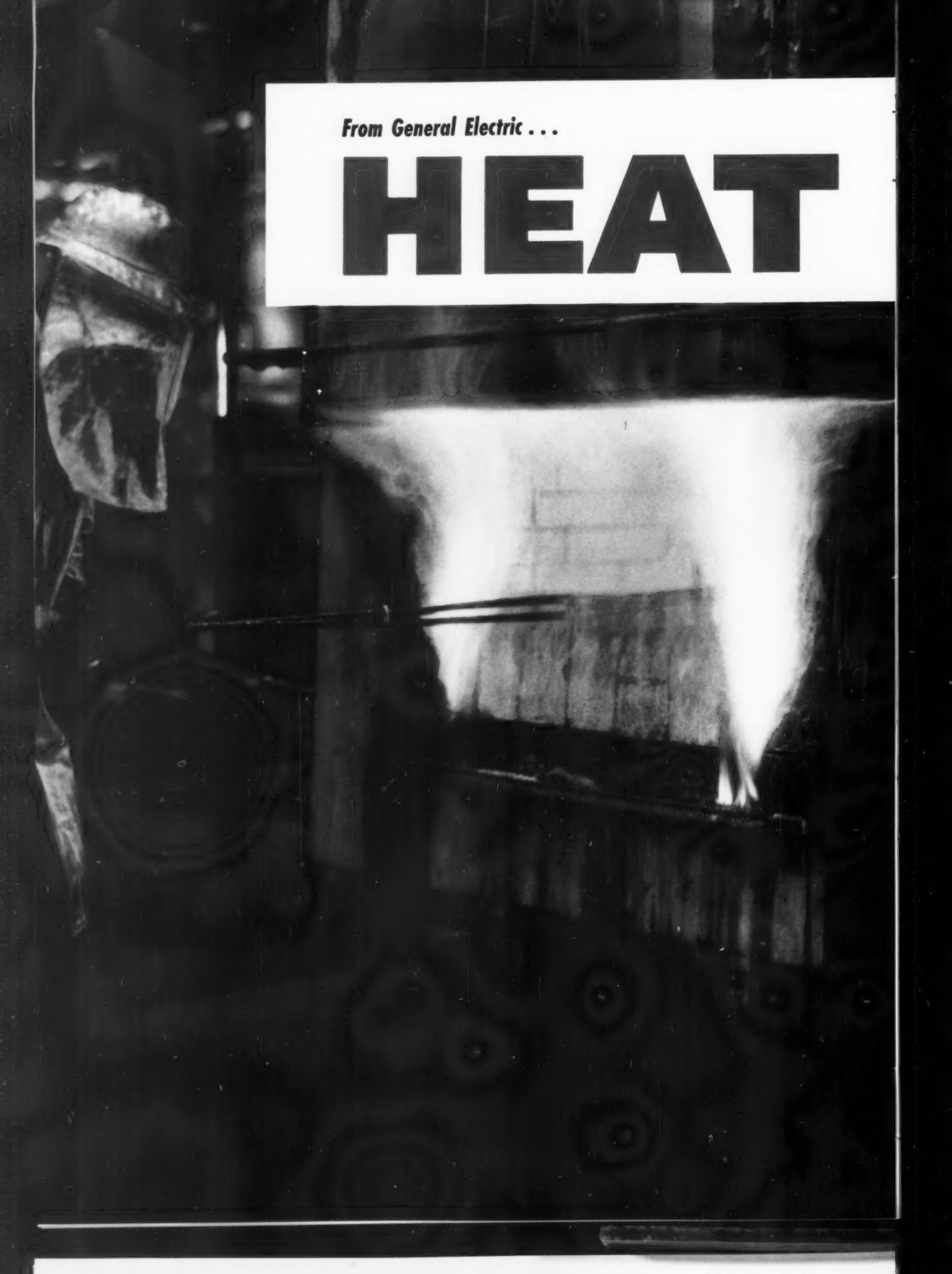
Flying Shear by BIRDSBORO

MM 73-59

BIRDSBORO

STEEL FOUNDRY AND MACHINE CO.

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • STEEL CASTINGS • Weldments "CAST-WELD" Design • ROLLS: Steel, Alloy Iron, Alloy Steel


From General Electric . . .
HEAT

GENERAL ELECTRIC OFFERS NEW ATMOSPHERE PRODUCERS FOR ELECTRIC AND GAS FURNACES

A complete line of new General Electric Exalene, Neutralene, Thermalene, and Ammalene atmosphere producers are available in "packaged" units. They're pre-piped, pre-wired and pretested to simplify and speed installation. And these attractive G-E producers give you ease and economy of operation and maintenance . . . measures of General Electric dependability.

G-E atmosphere producers can save you money . . . in production costs, because protective atmospheres prevent oxidation and decarburization. Costly machining is eliminated, and your product's quality is often improved. Material cost is less since you can produce your own low cost substitutes for hydrogen and nitrogen.

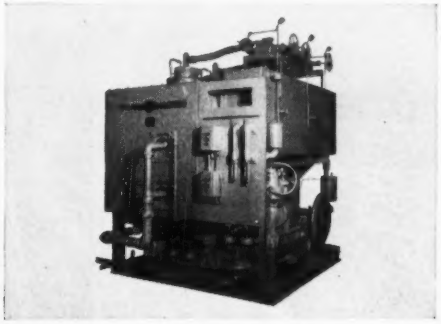
Flexibility, another money saving General Electric feature, provides for adjustment and control of the gas composition . . . you get just the mixture you need for the application.

When you purchase General Electric protective atmosphere equipment, you get the right equipment properly installed. And you can be sure that expert General Electric engineers, and service facilities are as near as your phone.

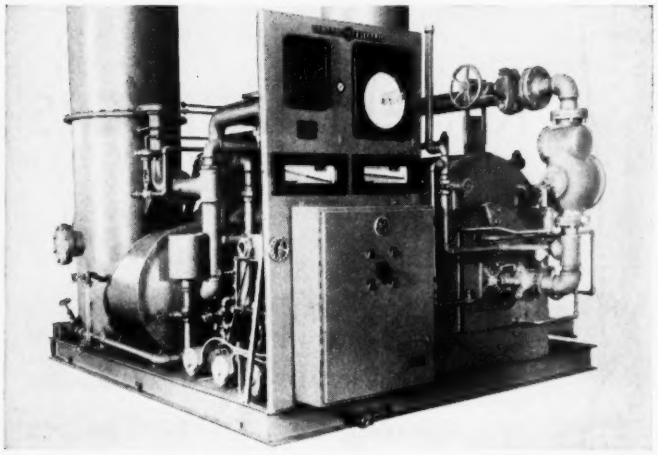
For more information, contact your nearby G-E Apparatus Sales Office, or write Section 721-27, General Electric Co., Schenectady 5, New York.

GENERAL ELECTRIC

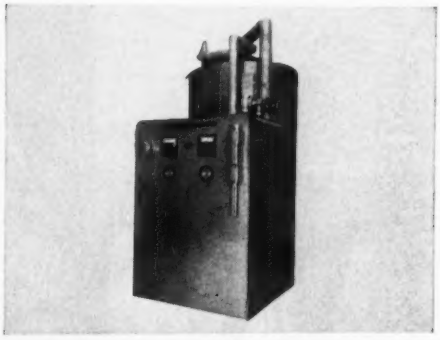
EXALENE PRODUCER for exothermic gas, lowest cost, most widely used gas, to 30,000 cfh.



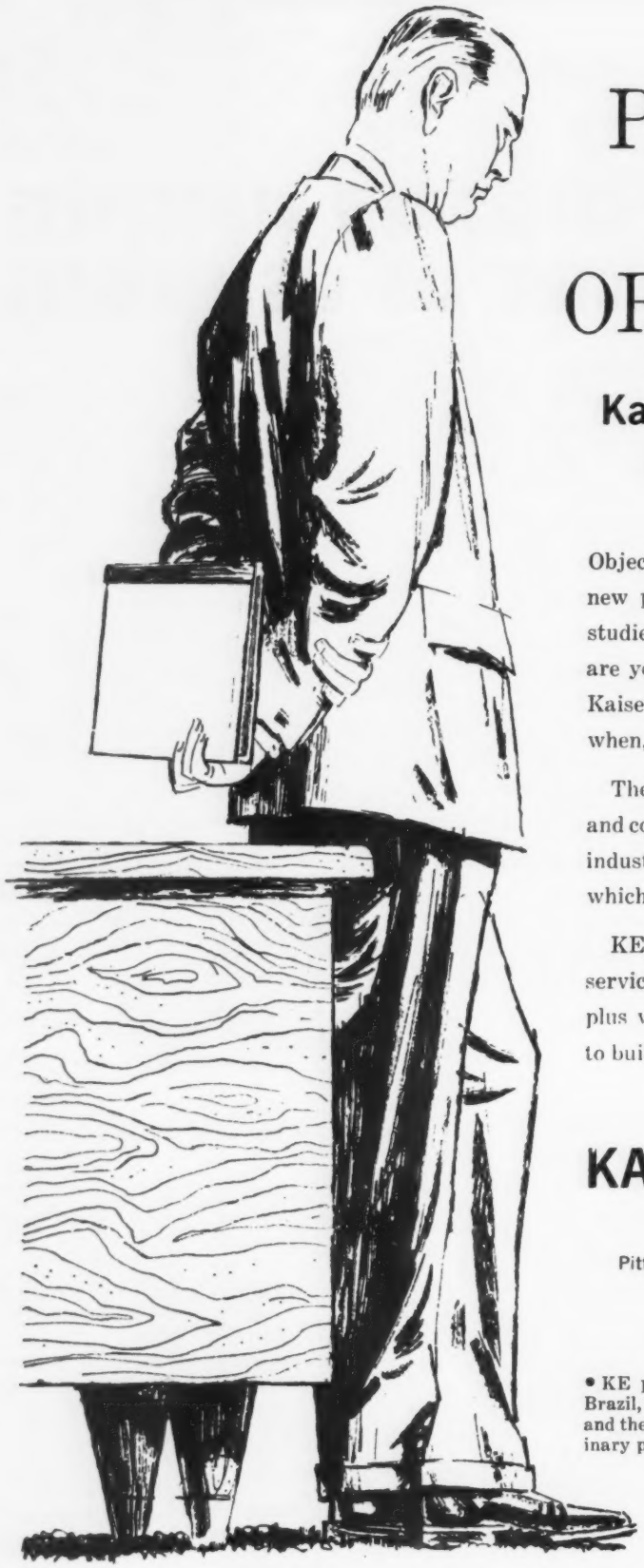
THERMALENE PRODUCER for endothermic gases to 3600 cfh with minimum of maintenance.



NEUTRALENE PRODUCER for purified exothermic gas. This economical G-E equipment available to 20,000 cfh. Also available with CO removal equipment.



AMMALENE PRODUCER for low-cost, high-purity hydrogen substitute to 8000 cfh.



PROCEED, DEFER OR MODIFY?

Kaiser Engineers can help you decide

Objective analysis is vital to sound decision on new plant or expansion projects. Feasibility studies, economic analyses and site evaluations are yours by an outside, impartial firm when Kaiser Engineers is selected to help you decide when, how and where to proceed.

These services are in addition to the design and construction of major facilities for the Steel industry—including the proven L-D Process for which KE is the U. S. licensor.

KE offers complete, one-company, integrated service from concept through construction—plus world-wide experience and the ingenuity to build quickly, within budget.

KAISER ENGINEERS

Division of Henry J. Kaiser Company
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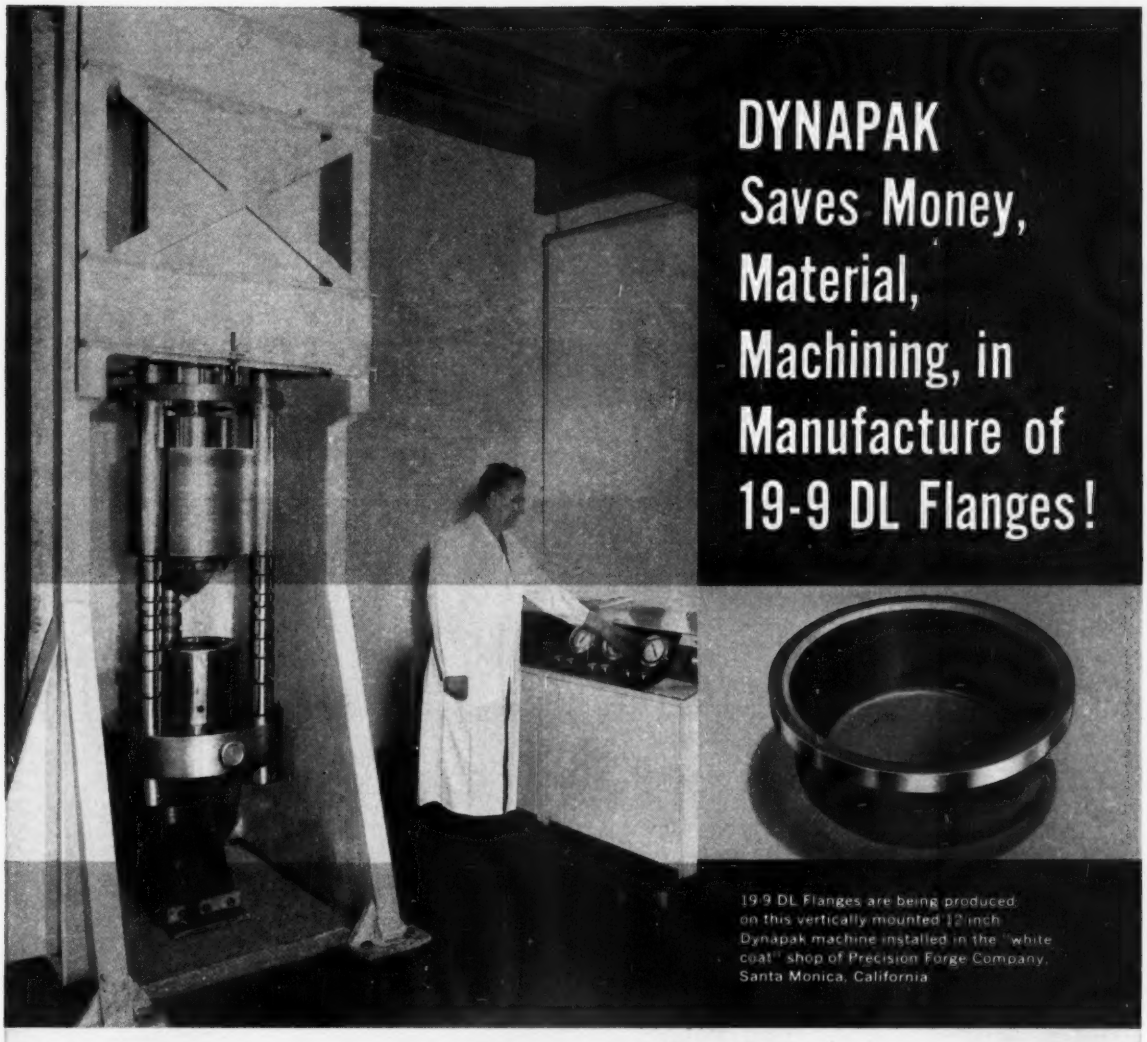
Pittsburgh, Washington, D. C., Chicago, New York

• KE projects include work in Argentina, Australia, Brazil, Formosa, Japan, New Zealand, as well as Canada and the United States. Assignments range from preliminary planning to plant construction.

5458-S



DYNAPAK Saves Money, Material, Machining, in Manufacture of 19-9 DL Flanges!

19-9 DL Flanges are being produced on this vertically mounted 12 inch Dynapak machine installed in the "white coat" shop of Precision Forge Company, Santa Monica, California

Here are the savings achieved in this Dynapak Application:

- MATERIAL: 60%
- TOOLING: 50% of the cost of conventional forging dies
- MACHINING: Reduced by more than 50% due to forging tolerances of 1/32 in. and elimination of draft angle.

PLUS

- PRODUCTION RATES: 70-80 per hour
- SUPERIOR PHYSICAL CHARACTERISTICS: Greater strength, uniform and controllable work-hardening, Grain Size No. 11.

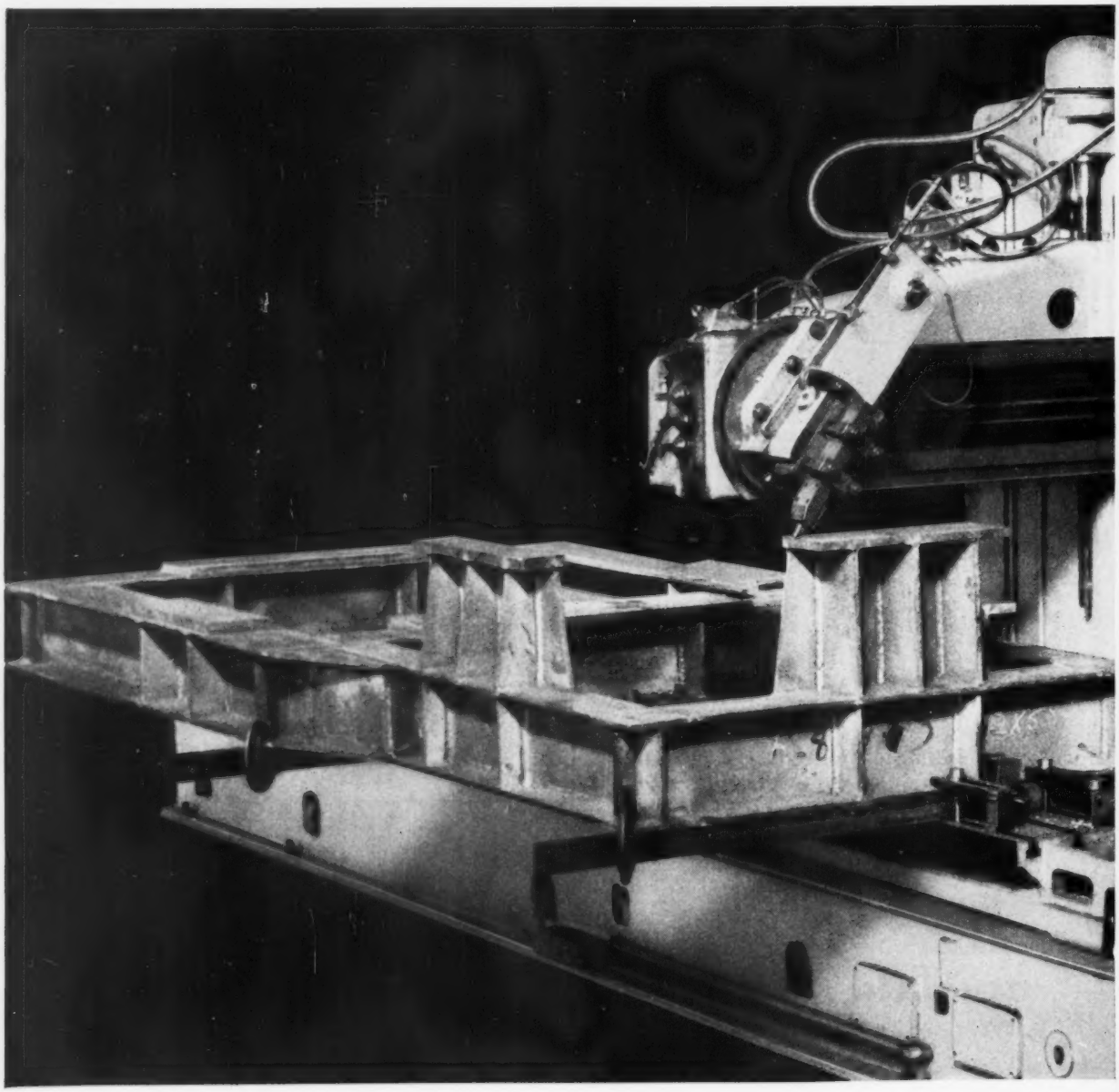
Dynapak, industry's first operational high-energy-rate machine tool, offers a breakthrough in metalworking's long-sought goal to produce forgings that can be used with little or no machining. This flange is just one of many forgings now being produced commercially by Dynapak. For complete information regarding application of pneumatically-energized Dynapak in your forging, extrusion, forming, or compaction operations, write, wire, or phone:

DYNAPAK

CONVAIR / A DIVISION OF GENERAL DYNAMICS CORPORATION

1243 Transit Avenue, Pomona, California • Telephone: NAtional 3-1561

Nothing does the job like a...



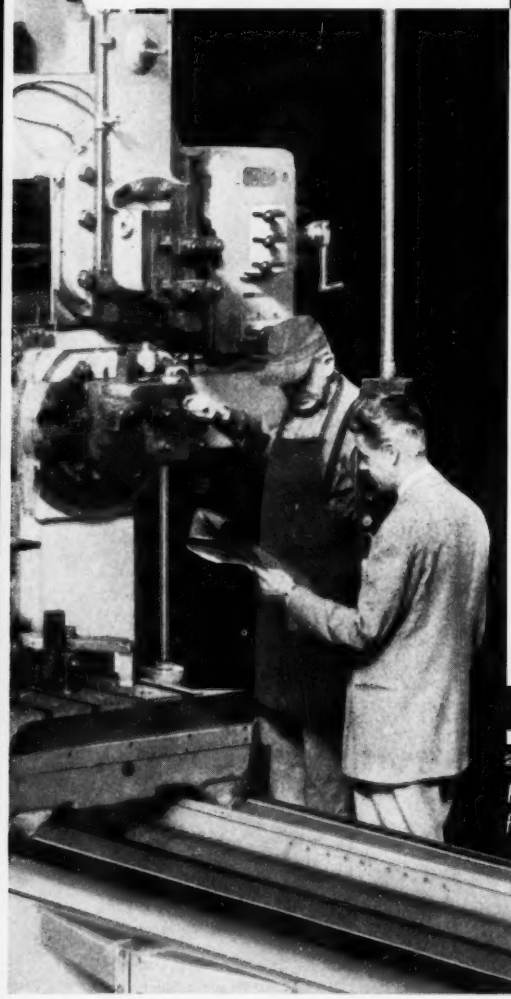
ROCKFORD

...h

HYDRAULIC

PLANER

MACHINES GENERATOR-BASE WELDMENT WITH LESS HANDLING AND SET-UP, IN ONE-THIRD NORMAL PRODUCTION TIME



Machining data:

Dimensions Weldment ..... 8'7" wide
.....15'3" long

Weight Workpiece .....5400 lbs.

Operation:
Planing top-side pads, highest pad 30½" from base of work.

Set-Up Time .....1st set-up, 1¼ hrs.,
.....2nd set-up, 1½ hrs.,
includes surface indication for continuation of cut.

Machining Time .....17¾ hrs.

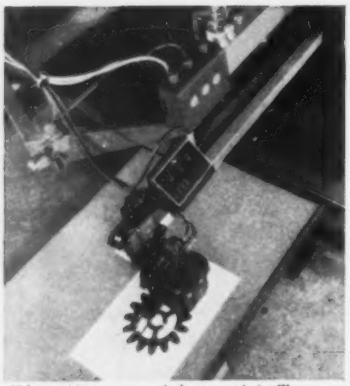
Nothing performs like hydraulic power:

- Infinitely adjustable feeds and speeds;
- Smooth, uniform cutting pressures for finer finish;
- Maximum metal removal per H.P. expended;
- Low Costs for machining, cutting tools and maintenance.

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

Pioneers In The Use of Hydraulic Power for Reciprocating Machine Tools

the Airco LINAGRAPH



The Aircotron (electronic) Tracer accurately follows a gear templet.

The Airco LINAGRAPH is the newest, finest multiple torch machine on the welding market today for flame cutting intricate shapes out of mill plate up to 96″ wide, in any length.

The LINAGRAPH's pantograph design enables its Aircotron (electronic) Tracer to follow a templet so precisely that in most cases further finishing of the flame cut part is unnecessary.

The LINAGRAPH features also a central location of all controls. Furthermore, the tracing table moves easily on rollers—lets you move the templet without moving the work itself.

It cuts steel plate up to 96″ wide and up to 12″ thick, using acetylene, natural or city gas or propane with up to six torches. The LINAGRAPH requires floor space only 19′3″ wide.

Extra lengths of rails and tracks and extra tracing tables can be ordered, and right- or left-hand operation is available.

For complete information on the New Airco LINAGRAPH, phone your nearest Air Reduction office. Or write us today for Catalog 804L.

AIRCO®

AIR REDUCTION SALES COMPANY

A division of Air Reduction Company, Incorporated

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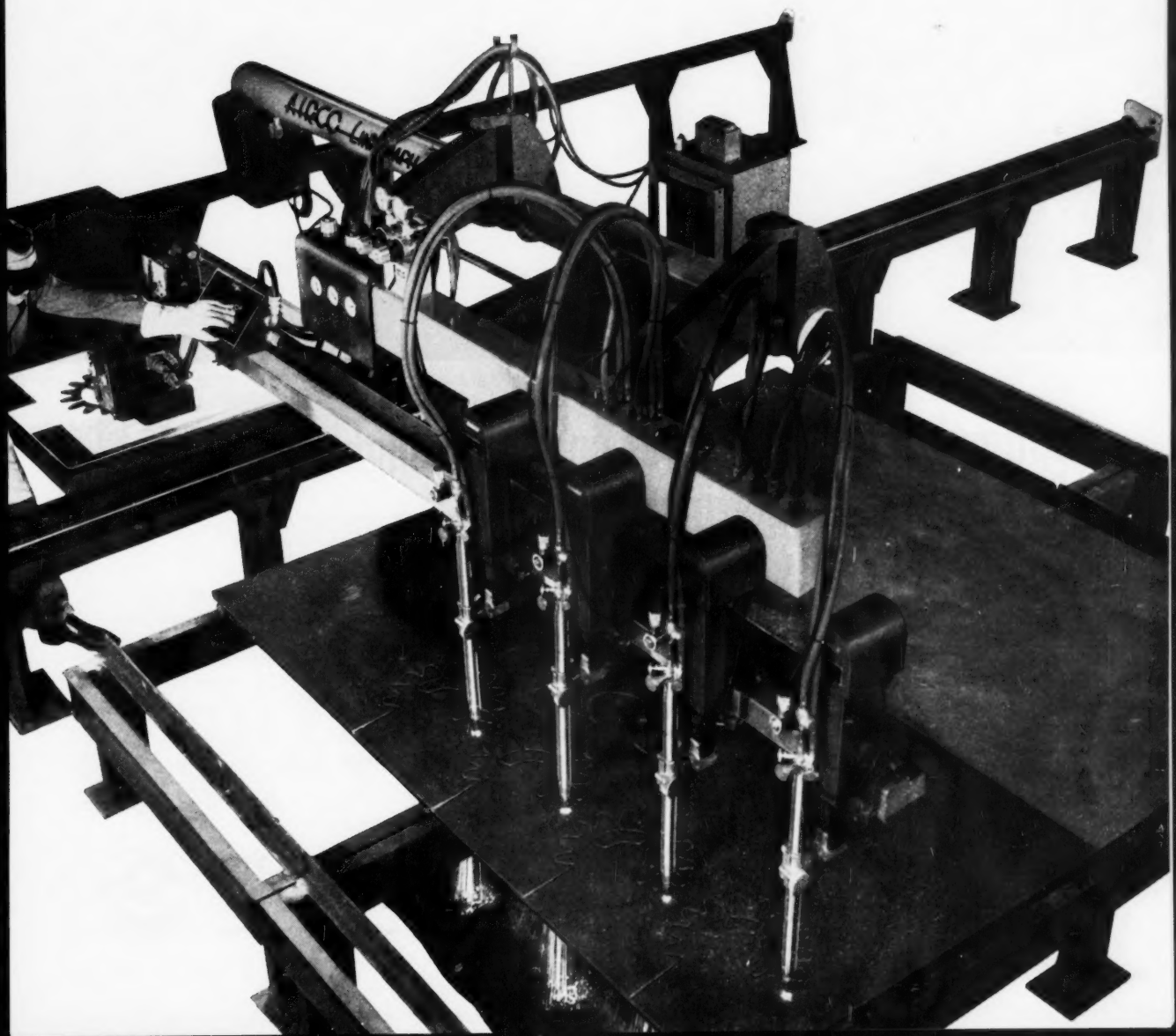
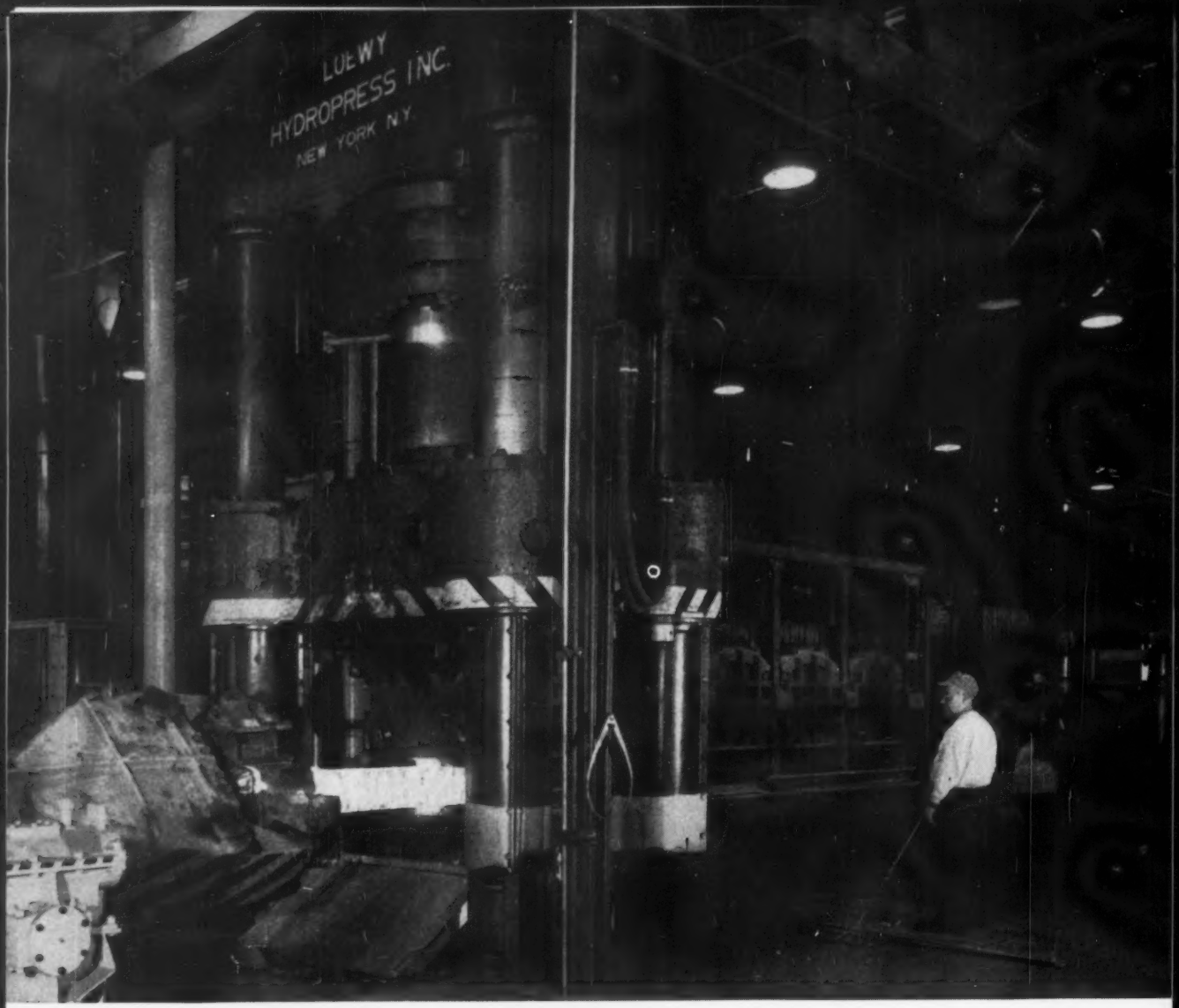
IT'S HERE

to make your flame cutting jobs more profitable





Loewy 1500-ton fast forging press in operation

Optimum output, ease of operation, high accuracy... all go with LOEWY free-forging presses

Designed for faster displacement of metal with fewer reheats, Loewy free-forging presses feature modern control systems that permit instantaneous selection of all the working cycles required for most efficient and accurate operation.

For normal forging and fast planishing, the operator controls the press without effort by a single hand lever through a sensitive oil-hydraulic servo control. With automatic operation, pushbuttons are used for either single or repeated strokes. Signals for reversal of press are transmitted to receivers on the operating pulpit by industrial-type electronic devices. All adjustments—stepless or incremental—for working level and for length of stroke and number of strokes per minute (up to 100) are made at the operating pulpit only. Automatic reciprocating control improves output, saves high pressure water, increases accuracy and prevents operator fatigue.

For detailed information on how Loewy-Hydropress free-forging presses can help solve your production problems, write Dept. B-12.

Loewy-Hydropress Division

BALDWIN · LIMA · HAMILTON

111 FIFTH AVENUE, NEW YORK 3, N.Y. Rolling mills • Hydraulic machinery • Industrial engineering

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NEW...

BROWNHOIST

75 TON WAGON CRANE

Built to the exacting standards of quality for which Industrial Brownhoist locomotive cranes are famous . . . the new rubber-tired 75 Ton Wagon Crane provides heavy-duty service in quarries, steel mills, shipyards, port and off highway construction jobs inaccessible to locomotive cranes. Patented Monitor-type cab and exclusive clear-vision boom provide the operator with 360 degree visibility for fast, efficient, safe operation. Write for new catalog 581.

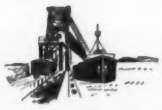
206

BROWNHOIST

CLAMSHELL BUCKET

250 TON WRECKING CRANE

COAL-ORE BRIDGE



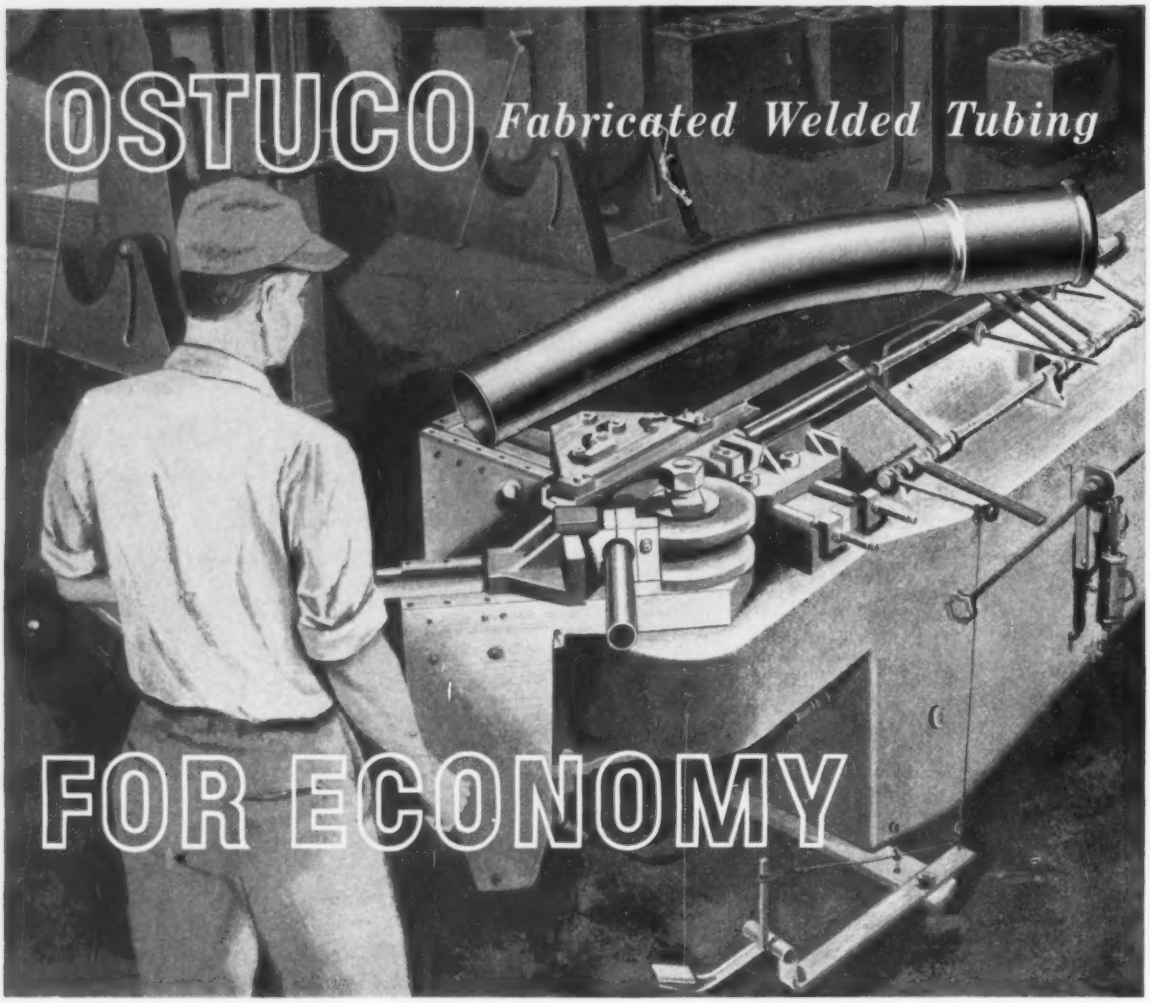
CAR DUMPER

LOCOMOTIVE CRANE

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: Cleveland, Philadelphia, Chicago, San Francisco, Montreal.

• AGENCIES: Detroit, Birmingham, Houston

Vacuum Cleaner Manufacturer Specifies



Bending vacuum cleaner wand. A variety of fabricating operations also is performed on Ohio Special Quality Seamless Tubing.

"Value analysis showed it would be more economical to buy than produce fabricated welded tubing parts for our new cleaner. What's more, we could avoid additional capital investment in equipment.

"So we added Ohio Seamless to our production line. They have the equipment and facilities to meet our design requirements and to hold to our stepped-up schedules. And we don't pay shipping costs on scrap — just on finished parts . . . "

Let Ohio Seamless translate your designs into finished parts . . . conserve your capital . . . cut your production and shipping costs. Contact your Ohio Seamless representative, listed in the Yellow Pages, or the mill at *Shelby, Ohio — Birthplace of the Seamless Steel Tube Industry in America.*

AA-8847

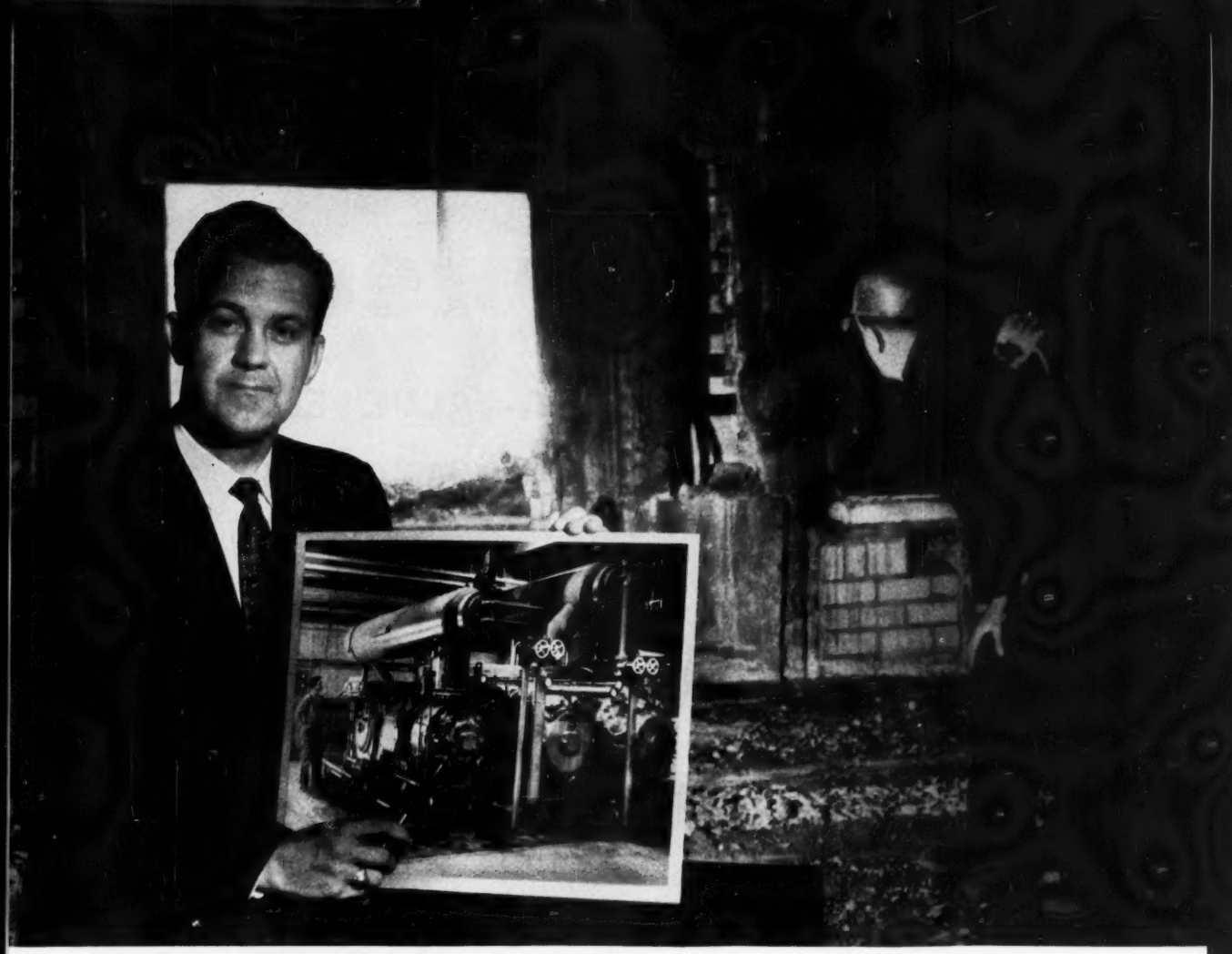
OSTUCO SHELBY, OHIO — OSTUCO TUBING

OHIO SEAMLESS TUBE DIVISION

of Copperweld Steel Company · SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Lynwood), Miami, Moline, New Orleans (Chalmette), New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York



Dann Goodson, *Manager Motor-Driven Compressor Sales, The Cooper-Bessemer Corporation, explains...*

How National Tube steps up production with oxygen

Lorain Works of National Tube Division, United States Steel Corporation, is increasing ingot output by injection of oxygen into open hearth furnaces. Introduced by lances extending through the roof down into the furnace, the oxygen speeds up production. It is fed directly into the metal in a volume of 28,000 cu. ft. per hour per furnace.

Another major use of oxygen at the Lorain Works is for hot bloom scarfing. The machine shown here removes seams and other defects, conditions blooms for rolling into top quality products. Entire operation is automatic, push-button controlled.

The 2000 hp Cooper-Bessemer Type JM Air Compressor, shown here, plays an important part in the manufacture of the oxygen used for these and other operations at the Lorain Works. This is a 4-stage unit, operating at 300 rpm with a discharge pressure of 1000 lbs. The plant was designed and built by American Messer Corporation.

Cooper-Bessemer can supply all types and sizes of reciprocating or centrifugal compressors, expansion engines and En-Tronic® controls for oxygen production.

Call our nearest office for engineering service when you start to plan your facilities.

BRANCH OFFICES: Grove City • New York • Washington Gloucester • Chicago • Minneapolis • St. Louis • Kansas City • Tulsa New Orleans • Shreveport • Houston • Greggton • Dallas • Odessa Pampa • Casper • Seattle • San Francisco • Los Angeles

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ENGINES: GAS - DIESEL - GAS-DIESEL
COMPRESSORS: RECIPROCATING AND CENTRIFUGAL
ENGINE OR MOTOR DRIVEN

in heavy-duty compressors

AIR-CUSHIONED CHANNEL VALVES

Highest efficiency • Exceptional durability • Quiet operation

FULL FORCE-FEED LUBRICATION

Filtered oil under pressure to all bearing surfaces

FULL-FLOATING ALUMINUM BEARINGS

Roll with the punch of each stroke to distribute load

SEALED FRAME

Keeps dirt out • Keeps oil in
Keeps wear down

these EXTRA-VALUE FEATURES mean top performance and economy

take FULL-FLOATING BEARINGS for example...

they "roll with the punch" to distribute load evenly; never need adjustment

Another of the exclusive features which have given Ingersoll-Rand compressors their reputation for excellence is the use of full-floating bearings. These heavy-duty bearings are free to rotate both on the bearing journal and within the connecting rod or bearing housing. Thus the rubbing speed is reduced and the wear is distributed evenly around the entire bearing surface, both inside and out — it is not concentrated at any point.

Aluminum gives longer bearing life — Main and crankpin bearings are made of a special aluminum alloy developed for bearing service. It is much stronger than most bearing metals, and has a higher load-carrying capacity and better heat conductivity.

These full-floating bearings are capable of many years of trouble-free operation, and never need adjustment. Thus the compressor frame may be kept sealed, so dust can't get in and oil won't leak out. Ingersoll-Rand compressors have many more quality features which can save you money — call your I-R representative today.

ESH
20 to 150 hp

PHE
75 and 100 hp.

XLE
125 to 350 hp.

PRE
400 to 2000 hp.

XPV
(Steam-driven)
200 to 1500 hp.

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COMPRESSORS • GAS & DIESEL ENGINES • PUMPS • AIR & ELECTRIC TOOLS • CONDENSERS • VACUUM EQUIPMENT • ROCK DRILLS

Work with your AIM*... Detroit Steel Corporation does...
Steel Strapping improves coil handling

DETROIT STEEL CORPORATION, HAMDEN, CONNECTICUT, sought a better way to strap coils of strip steel for shipment. Their Acme Idea Man suggested an Acme Steel Pneumatic Stretcher to secure steel coils to wood pallets. (Idea No. U6-31)

Acme Idea Man A. J. Payne serves many companies with time and money-saving ideas.

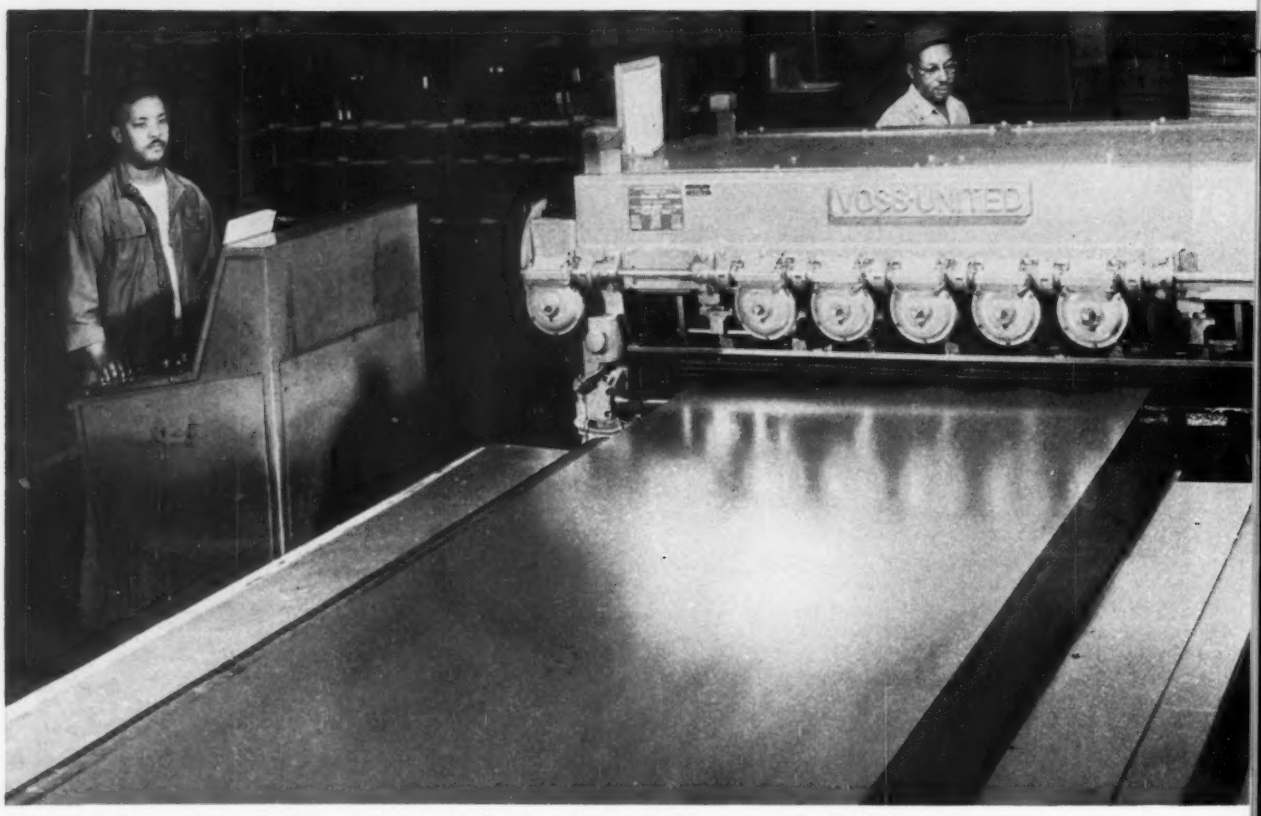
Now, with the Pneumatic Stretcher, all coils of steel are palletized with the same constant, even tension. Customers like this improved method since pallets arrive in damage-free condition because of the tighter, more secure straps. Employees like the Acme Steel Pneumatic Stretcher as it reduces fatigue and tiresome hand labor.

***Work with your Acme Idea Man.** His suggestions have saved time, money and eliminated shipping damage for many companies. Contact him at the nearest Acme Steel office. Or write, Dept. SDU-129, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois.
In Canada, Acme Steel Company of Canada, Limited, 743 Warden Avenue, Toronto 13, Ontario.

ACME STEEL **STEEL STRAPPING**

Pittsburgh Steel Sheet Used . . .

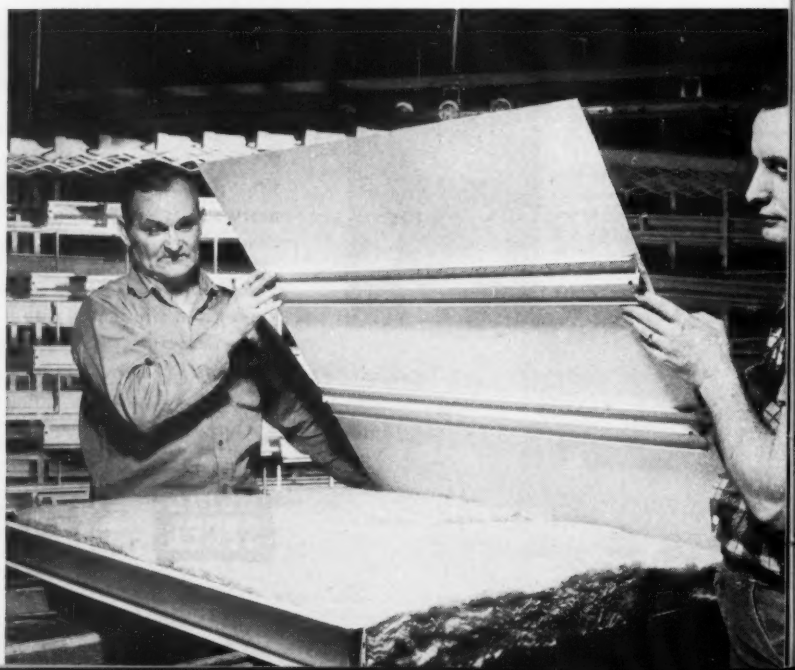
Where Flatness Makes Good Steel



Roller leveling to achieve dead flatness is easy with Pittsburgh Steel Co. Sheet, says The E. F. Hauserman Co.

A vertical member, showing sharp corners and severe bends, is embossed and punched on this 500-ton Cincinnati press brake.

Assembly for a flush steel and glass panel is being completed here. Rock wool batting provides sound control and insulation. Note reinforcing ribs on back of panel being placed on "sandwich."



Sandwiches

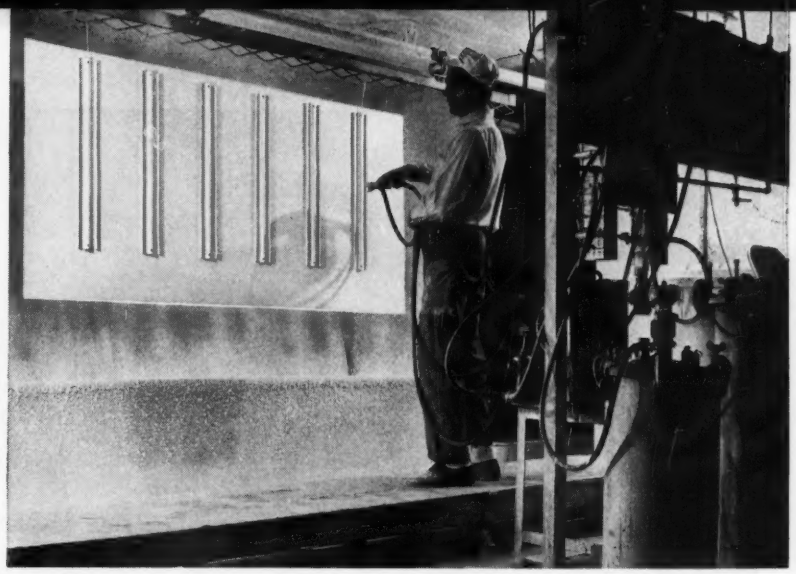
E. F. Hauserman hates ripples . . . The E. F. Hauserman Co., that is.

The Cleveland firm, world's largest producer of movable, interior walls, hates ripples because any kind of ripple in a wall panel is very visible to the eye. The slightest ripple produces a pattern of light and shadow.

To avoid rippling walls, The E. F. Hauserman Co. uses large quantities of cold rolled sheet steel from Pittsburgh Steel Co. because it's easy to achieve dead flatness with Pittsburgh Sheet.

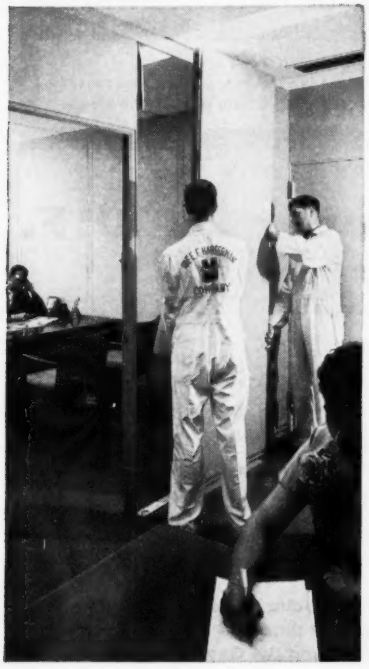
Pittsburgh Steel Co. is one of the leading quality producers of cold rolled sheet steel—the most important raw product in the Cleveland plant. Hauserman must have flat panel plates which can be roller leveled to dead flatness. Sheet provided by Pittsburgh Steel helps achieve dead flatness with a minimum of processing.

The Hauserman company designs, engineers, manufactures and erects movable interior walls for commercial, industrial and institutional buildings on a nation-wide scale. Steel partitions provide greater movability, better appearance, lower maintenance, earlier occupancy, good access for utilities, efficient sound control, fire safety, greater rigidity and low cost through use of economical steel.



Paint line shows partition panel measuring 7 feet by 36 inches getting a primer coat. Good surface of Pittsburgh Steel's sheet shows up here where any flaws would mar paint job.

Typical installation of a Hauserman movable wall can be made without chasing occupants out of offices.



• **Gage**—Hauserman watches gage very carefully. Their Wean slitter is equipped with an Easterline-Angus electronic recording device which makes a written record of every inch of sheet processed. Pittsburgh Steel meets specifications for gage consistently.

• **Formability**—While flatness is a prime consideration, Hauserman also insists on excellent formability in sheet steel.

A great variety of formed parts, including cornices, inner bases, post caps, bases, spreader channels and reinforcing ribs, are made with severe bends and sharp corners. In some parts a lip of steel is bent back on itself through a 180-degree angle.

Because cold rolled sheet supplied by Pittsburgh Steel takes these strains without rips or tears, Hauserman has less scrapped material.

• **Surface**—Steel panels get three in-process inspections to make sure surfaces of panels and component parts are free of flaws. Defect-free surfaces make it possible for Hauserman to spray paint with assurance that the paint job won't be marred by flaws showing through.

• **Weldability**—Finally, Hauserman demands good weldability. Component parts and assemblies are fastened by both flash and resistance spot welding. Pittsburgh sheet makes a better product and reduces operating costs by taking a good weld without slowing production.

When a sheet user as exacting as The E. F. Hauserman Co. finds Pittsburgh Steel Co. sheet meets requirements consistently, you and other sheet users can confidently order from Pittsburgh Steel. Whatever your requirements may be—flatness, formability, surface, uniformity in gage, weldability or deep drawing quality—you'll benefit from putting Pittsburgh Steel sheet on your production lines. Trained personnel is available to help with any steel problem. Call a Pittsburgh Steel man today. You'll find him in any of the district offices listed below.

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

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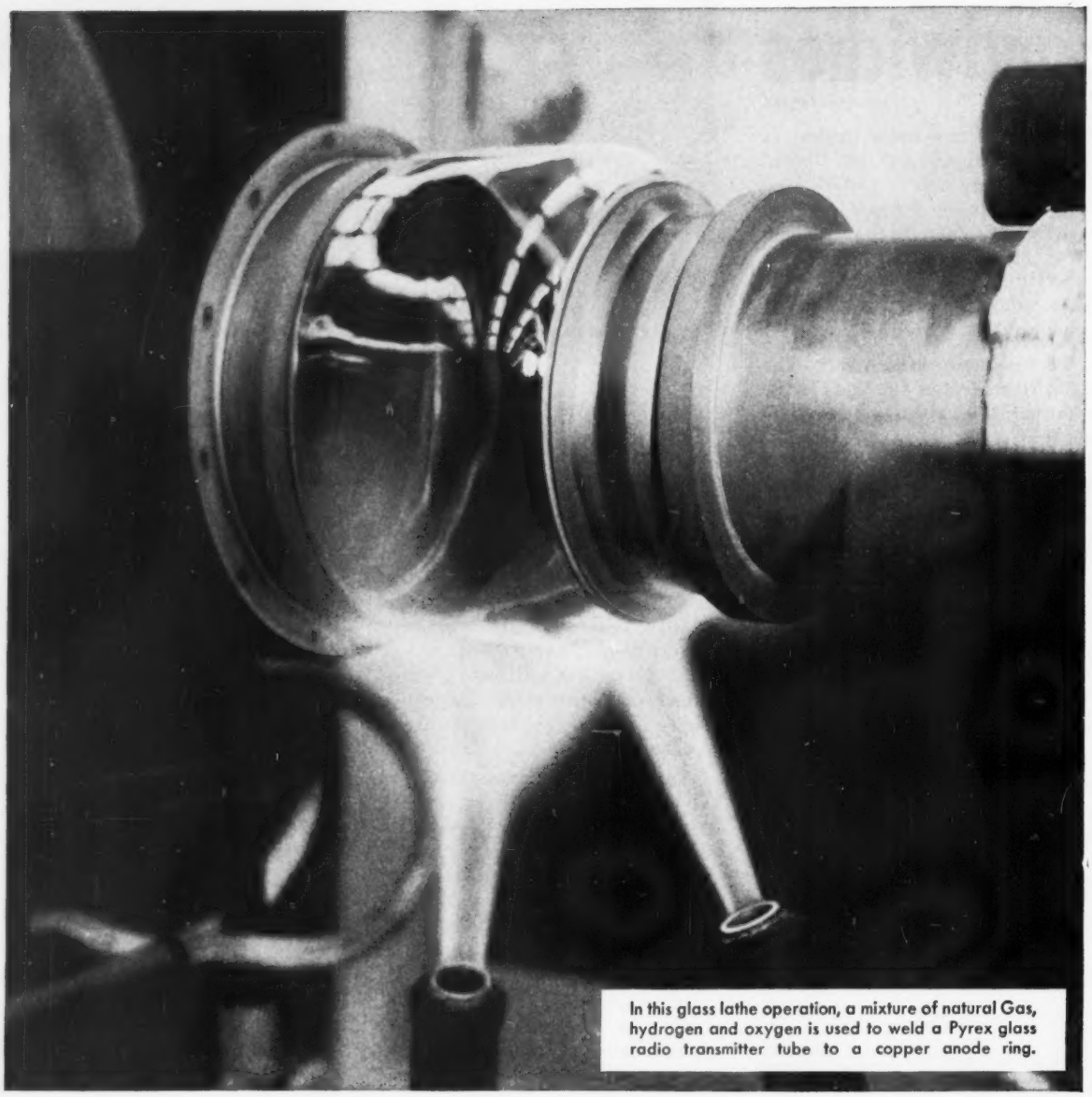
Atlanta	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio



In this glass lathe operation, a mixture of natural Gas, hydrogen and oxygen is used to weld a Pyrex glass radio transmitter tube to a copper anode ring.

RCA welds glass to metal at over 2000° F. ...thanks to GAS

Natural Gas is used to weld glass to metal in the production of radio and television tubes of many types at the RCA Electron Tube Division plant in Lancaster, Pennsylvania.

To effect the weld at over 2000° F., a mixture of natural Gas, hydrogen and oxygen maintains the high welding temperature on the Pyrex glass and metal parts as they rotate on a glass lathe. A Gas flame is then used to control and equalize the cooling of the glass down to the 900-600° F. range.

For information on how Gas can help you in your production operations, call your Gas Company's industrial specialist. He'll be glad to discuss the economies and superior results you get with Gas and modern Gas-fired industrial equipment. *American Gas Association.*

•

See Playhouse 90 with Julia Meade on CBS-TV. Watch local listings for time and station. Sponsored by your Gas Company and the Gas Industry.

style is stainless steel

Stainless Steel is the only surfacing material with a hard lustrous finish that is always in style, withstands exposure to all kinds of wear and has a low maintenance cost for the life of the building.

No other metal offers the freedom of design and fabrication, economy of care and the durable beauty that serves and sells like Stainless Steel.

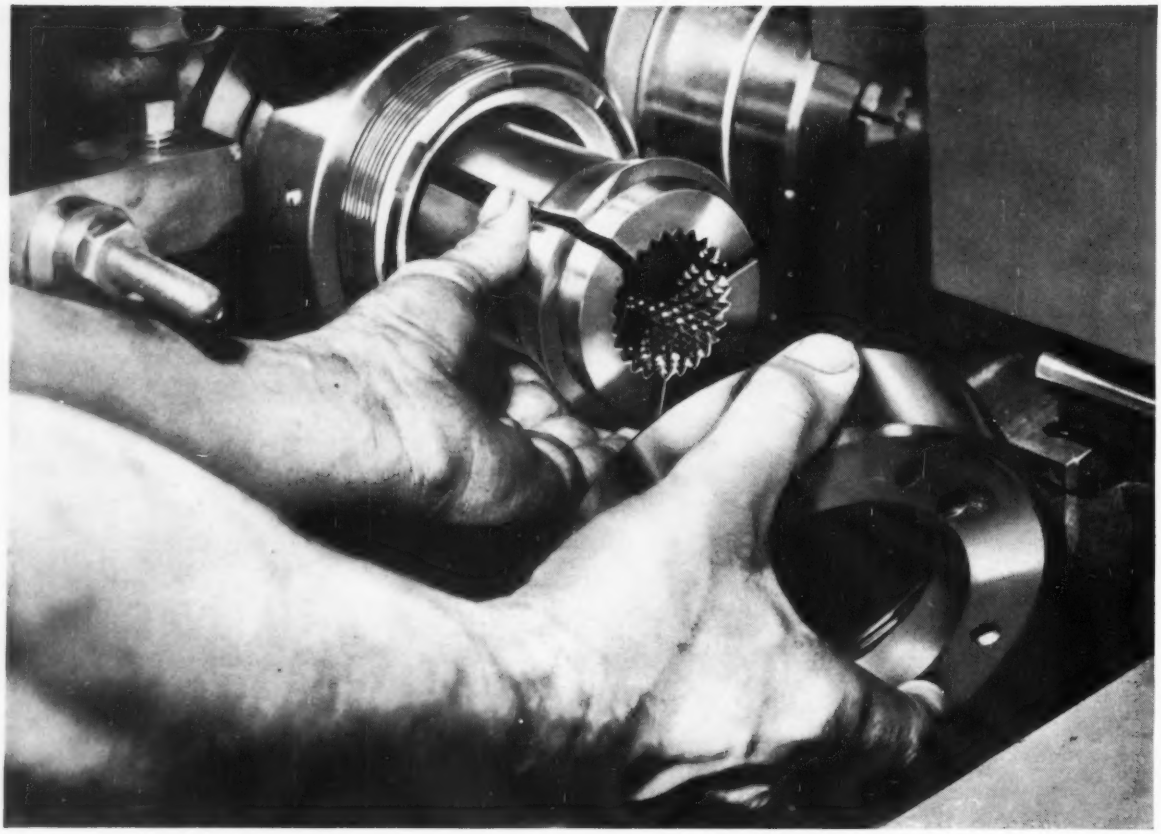
McLOUTH STEEL CORPORATION, Detroit 17, Michigan

specify

McLOUTH STAINLESS STEEL

HIGH QUALITY SHEET AND STRIP

for architecture



Inspecting 4615 nickel alloy steel spindle in Greenlee 6-Spindle 2" Automatic Bar Machine assembled with collet and 4615 steel spindle nose nut. Greenlee Bros. & Co., Rockford, Ill., also produces 1" and 1⅝" bar machines.

How Greenlee uses two general purpose nickel alloy steels to keep precision machines precise

1...case-hardening 4615 for wearing parts 2...through-hardening 4340 for stressed parts

Do you know that by varying heat treatment of just two nickel alloy steels – 4615 for case-hardening, 4340 for through-hardening – you can give desired hardness and strength to most heavy-duty machine tool parts?

For proof – consider the Greenlee 2-inch automatic bar machine above.

Each spindle is 4615 steel, carburized and hardened to Rockwell C 62-64. The hard case holds down wear or loss of running accuracy, even though spindles turn directly on 5 speed ball bearings. High speed torsional stresses are taken in stride by the tough, strong core. The low distortion characteristics of 4615 steel during heat treatment help to keep true-running accuracy.

4615 steel also gives the same excellent wearing qualities in spindle nose nuts, idler gears, bushings and sleeves.

4340 steel strengthens highly stressed parts

Through-hardening 4340 nickel alloy steel is the off-the-shelf steel Greenlee uses for heavily stressed parts – for example, certain shafts heat treated up to 225,000 psi tensile strength.

Stocked in Steel Service Centers across the country

Versatile 4615 and 4340 nickel alloy steels are available for quick delivery from Steel Service Centers throughout the country . . . ask us for a list of centers where you can buy them. Write us, too, for specific questions concerning these two steels.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street INCO New York 5, N. Y.

INCO NICKEL

NICKEL MAKES STEEL PERFORM BETTER LONGER

GE's Boulware Talks About Labor Unions

In the midst of the toughest labor contract bargaining in recent years, STEEL visited L. R. Boulware, chief architect of General Electric Co.'s famous industrial relations policy. He charges that too many union agents do little but preach hatred. "They don't give management enough help in trying to arrive at the best kind of contractual arrangement for employees," he says. GE's counterattack includes year-round communications with its employees, publication of any contract offer as soon as it's made to the union's representatives, and placement of all contract terms on the table at one time (Page 94).

Industry Leaders Read the Crystal Ball

Here's how industry representatives at a U. S. Chamber of Commerce conference see 1960 business: Steel—Production of 130 million tons . . . critical shortages for several months. Construction—Spending to climb about $2 billion to $56 billion, spurred by industrial expenditures. Money and credit—A tight money market with interest rate decreases unlikely. Autos—Sales of conventional cars: 5.5 million; compact cars: 700,000; imports: 500,000. Railroads—Management will be firm in demands to end featherbedding, which could lead to a strike after Feb. 1. If there is no strike, traffic will exceed 1959's by 8 to 10 per cent. General—GNP will climb to $505 billion or more; prices will continue upward; business expansion will continue in the second half of '60, but at a slower rate than the first half's rise.

How to Get Your Employees to Work Smarter

Work simplification is going over big. Seldom has any technique been adopted with such enthusiasm or rapidity by so many companies. A major reason: WS brings out the creativity in your employees—from top management to floor sweeper. It gives them the opportunity to improve the efficiency of their operations. But it requires much tender care. For tips on how to give it that, see Page 104.

UAW's Benching of Gosser Puts Veep Job Up for Grabs

Look for more reshuffling among the United Auto Workers brass following the word that Richard Gosser, vice president, will be taking a "six month rest." His job as organizing leader has already been taken over by Reuther

and six regional directors. The vacancy puts a veep's job up for grabs. Two hopefuls are Martin Gerber, Region 9 director, and Ray Berndt, Indiana regional chief. Emil Mazey, UAW secretary, has taken over Gosser's other jobs, including negotiations in Toledo, Ohio, Gosser's home territory. Outlook—less sympathetic treatment for plants in that area.

GM Strives to Make Up Production Lost During Strike

General Motors Corp. is shifting its carmaking facilities into high gear after being idled by lack of steel. John F. Gordon, president (left), says as soon as the steel industry gets back to normal, the production rate will be limited only by each carmaker's ability to meet the competitive values of the others. He looks for continued increases in auto sales, with the domestic market reaching 9.2 million trucks and cars by 1965. Standard size autos will remain "the backbone of the business," he asserts, although the compact jobs are off to a fast sales start (Page 107).

Big Year Ahead for Pipe, Oil Country Goods

Look for natural gas pipeline firms and distributors to spend $1,898 million for construction next year—including $775 million for transmission and $716 million for distribution. It means rising sales for makers of pipe, valves, compressors, meters, and regulators. Line pipe producers predict they'll ship about 3.5 million tons in '60 (vs. 2.6 million this year). To learn the reasons behind the growth—and what you can expect in pipe deliveries—see Page 191.

Quality Is a Team Effort

When this meeting (picture) ended, Thompson Ramo Wooldridge Inc., Cleveland, had trimmed 20 per cent from manufacturing costs, reduced scrap by 93 per cent, and upgraded the quality of a forging. The quality team oversees performance from raw material to worn-out product (Page 142).

Businessmen Need Liberal Arts Training

"A businessman must live with himself and his fellow man; he must work with and through people during his entire life." That's how Wenzil K. Dolva, dean of the School of Business, Western Reserve University, answers people who want a more practical approach to business training. He says these

courses are important areas for the businessman: English, sociology, psychology, philosophy, sciences, history, political science, mathematics.

Latin America: Will a Big U. S. Market Inch Away?

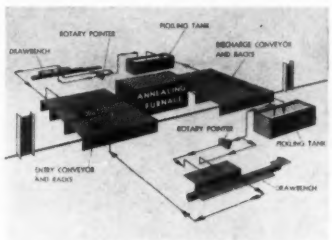
Latin Americans still buy more goods from the U. S. than from any other country, but European and Japanese firms have enlarged their share of the market by about 10 per cent since 1950. They now account for around 30 per cent of Latin America's imports. The gains are made at the expense of U. S. firms, whose labor rates are usually to blame. But the foreign firms can't meet the speedy deliveries offered by most U. S. makers (Page 91).

Material Handling Equipment Sales to Rise

Manufacturers of industrial material handling equipment look for sales in '60 to be 15 to 25 per cent better than 1959's, finds a survey by Material Handling Institute. But the makers say their optimism is hinged on an early labor agreement in the steel industry.

Loop-the-Loop Installation Anneals Copper Base Tubing

The secret to uniform properties in brass and copper tubing: Precise control of annealing temperature. An installation at Scovill Mfg. Co.'s New Milford, Conn., plant offers that and also gives the observer an intriguing study of facility arrangement (Page 138). Surface finish can be easily controlled.



Westinghouse Chief Says Commercial Atomic Power Is Close

Atomic powerplants are about ready to compete commercially with conventional facilities, contends Gwilym A. Price, chairman, Westinghouse Electric Corp. He reports that progress in design has reached the point where it is possible to guarantee plant cost, capacity, and fuel consumption.

RCA Head Urges Fourth Branch of Government

John L. Burns, president, Radio Corp. of America, is urging prompt consideration of his proposal to set up a fourth branch of the federal government—a permanent council on plans and policies. It would shape long range objectives, policies, programs, and strategy in all fields—military, eco-

nomic, foreign, social, and psychological. It would include representatives from science, education, business and industry, labor, and the military services. One goal would be to step up basic research activity. Mr. Burns points out that only about 0.2 per cent of the nation's GNP goes for basic research.

Unusual Washer-Dryer To Hit Market Next Year

Can a newcomer crack the home appliance market, countering the postwar trend toward fewer and larger appliance makers? White Products Corp., Middleville, Mich., maker of water heaters, thinks it can with a new washer-dryer concept. Instead of using a conventional washing drum, it will have a conical drum that's shaped like an ice cream cone. The horizontally mounted drum rotates within two cylindrical needle-bearing wheel races at low speeds. Centrifugal force, instead of a pump, pushes the water out. The unit is electrically operated. Coils heat the water pumped in for a cold soak to about 150° F within 3 minutes. The wash cycle then begins.

Congressman Warns You to Become Active in Politics

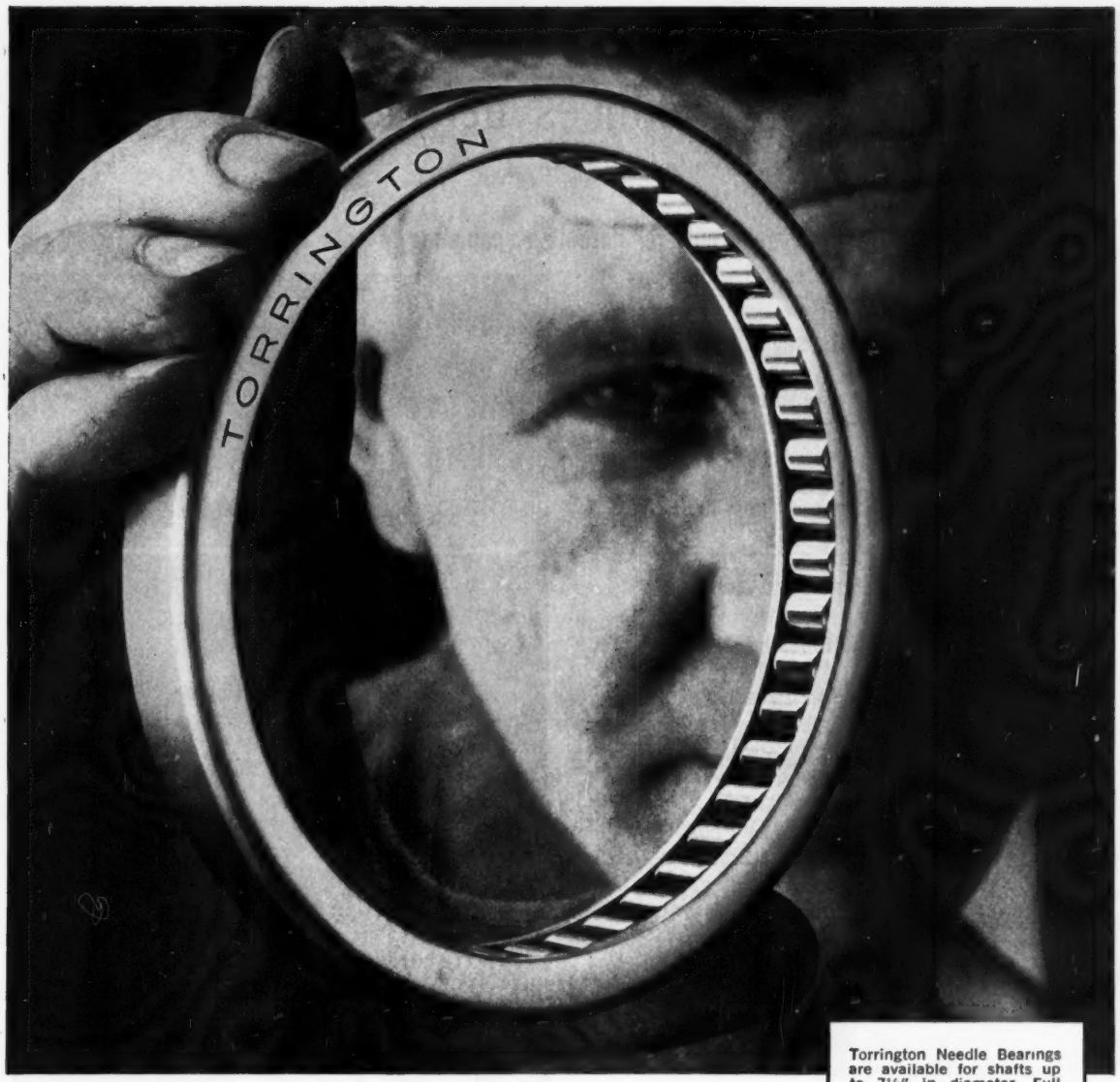
"It requires an investment of about $15,000 to make one job in industry and our population will grow by 33 million in the next ten years. So tax laws must provide (such things as) adequate depreciation and realistic depletion . . . if the economic and industrial potential of the nation is to realize full fruition," asserts Rep. Jackson E. Betts (R., Ohio). Tax collections take one-third of our net national product, so "we are one-third of the way along the route of total socialization," he warns. To maintain our traditional economic opportunity, businessmen must become more active in public affairs, he says.

Hooker Reveals New College Aid Program

Hooker Chemical Corp. has established a "corporate alumnus program" to encourage its employees to support their alma maters. In any year, Hooker will match an employee's contribution (up to $500) to any qualified institution of higher learning. The program "will enable us to support those institutions in which our employees show an active interest," says Hooker.

Straws in the Wind

Corporate financing will pick up rapidly next year if steel labor troubles are resolved, believe most of the delegates attending the Investment Bankers Association meeting last week . . . Aluminum Co. of Canada Ltd. has sold about 5000 tons of aluminum to Red China this year and hopes to make additional sales there . . . Pension funds in industry, growing at the rate of $4 billion annually, total more than $39 billion, reports the Twentieth Century Fund, New York. It says more than one-fourth of the nation's workers are covered by private pension plans, which are exerting a strong—and mounting—influence on the level of savings, the capital markets, and the buying power of millions of people.



Torrington Needle Bearings are available for shafts up to 7¼" in diameter. Full complement of rollers provides highest radial capacity for a given cross section. They offer low unit cost, compactness and light weight and long service life. They take a press fit in a simple straight-bore housing, run directly on hardened shafts, permitting use of larger and stiffer shafts.

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You have everything to gain by applying a large diameter Torrington Needle Bearing in your heavy duty applications.

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These advantages have been proved in performance in tractor bolsters, transmissions and final drives. In haybaler crank shafts. In power shovels. In heavy duty hydraulic pumps and starting motors. In road wheel arms on tanks. Why not talk over *your* application with your Torrington representative? **The Torrington Company, Torrington, Conn.—and South Bend 21, Ind.**

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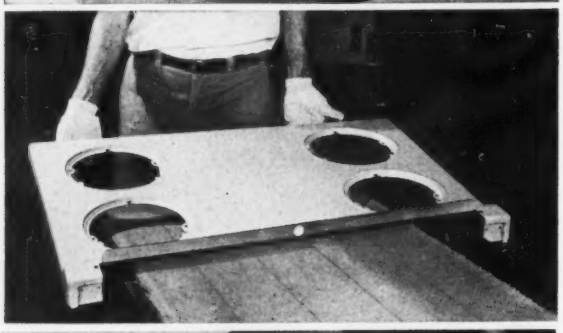
Commercially-pure Armco Enameling Iron contains a minimum of gas-forming impurities. Because of its high purity, costly shop rejects for finish defects stay low.



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Unhappy Steelworkers?

"Steelworkers are back on the job. If you check a little closer, you'll discover that these are not happy workers. These are not the free men who eagerly turned out tons of steel to serve the nation in war and in peace," says *Steel Labor*, the tabloid newspaper that professes to be the "voice" of the United Steelworkers of America. It continues:

"For 116 days, these steelworkers, their wives, and their children suffered privation, and hunger as they endured the ravages of the industry-fomented shutdown.

"They had a purpose—a goal, if you please. They were fighting for right and for justice. From this profit-bulging industry, they were offered a mere pittance for loyal service. Continuation of an outmoded and outdated contract without change was tossed to them on a 'take-it-or-leave-it' basis.

"Not satisfied with this zero-minus offer, the fat cats of the industry then proposed to raid the union contract and smash its protections, including pensions, seniority, work rules, vacation schedules, job rights, and a host of other things too numerous to mention.

"After months of negotiating filibusters . . . the hard-headed steel moguls . . . had to be bailed out (by Taft-Hartley) in this national emergency."

Such invective, exaggeration, and distortion are directed in a steady stream by USW leaders to its members.

They are the same leaders who bragged at their convention in Atlantic City last year that American steelworkers are the highest paid industrial workers in the world.

These labor leaders apparently assume that working people are completely naive and gullible.

But are they?

In the four short weeks the "unhappy" workers have been back on the job, steelmaking operations have skyrocketed from about 20 per cent to more than 92 per cent of capacity. The pace took far less time to achieve than anyone anticipated.

To us it means two things: 1. McDonald needs to find out what his membership really wants. 2. Management needs to keep working people informed with unadulterated facts so they can make up their own minds on controversial issues.

Irwin H. Such

EDITOR-IN-CHIEF

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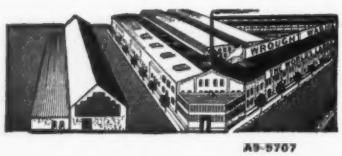

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Construction Poised for Record

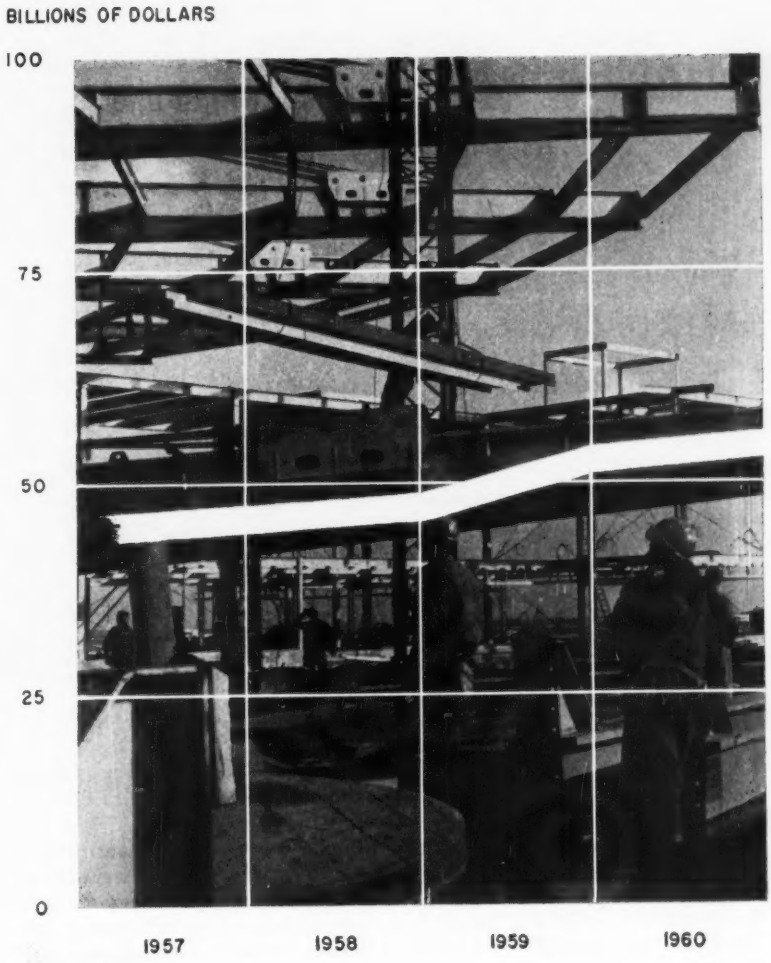
INDUSTRIAL BUILDING will bounce up 25 per cent in 1960 and be the No. 1 element of strength in next year's construction picture.

Outlook: Construction over-all should chalk up another record—between $55 billion and $56 billion, up about 2 per cent from 1959. This year's expected $54 billion volume is the first time construction has topped the $50 billion mark.

Structural steel fabricators attending the 37th annual meeting of the American Institute of Steel Construction Inc. in Boca Raton, Fla., last week were generally optimistic about their prospects.

Members expect industry and public utilities to order 45 per cent more material in 1960 than this year. New factories will account for 1.6 million tons of fabricated steel. That indicated expansion in private industrial construction also suggests a sharp recovery for capital equipment builders.

Commercial building, second largest market for the steel fabricators, should increase about 16 per cent (see chart on Page 90) and require close to 825,000 tons of structural steel in 1960. The steel fabricators also look for about 700,000 tons of material to go into highway and bridge construction.



†Bureau of Census.
*Estimated by BDSA.
Source: Commerce Department.

• **Strike Fears**—The only obstacle to an excellent year, commented the fabricators, is the possible resumption of the steel strike in January. Many of their industrial customers, they report, are delaying projects until management can get a clearer picture of what is going to happen in the labor picture.

A settlement in the steel dispute will be followed quickly by large releases of pending work.

Over-all, steel fabricators look for a 20 per cent boost in bookings next year, bringing the total to 3.5 million tons. The age-old problem of profitless prosperity continues to plague them—too close bidding is keeping profit margins low. Steel shortages from the mills will be a problem for fabricators through the first half of 1960. It'll get worse before it gets better and some may face shutdowns.

• **Weak Spot**—Major weakness in next year's construction forecasts comes from housing, the biggest single element of construction activity. And the blame goes to tight money, not the lack of demand, home builders are swift to point out.

Housing starts next year will be around 1.2 million, down from this year's expected 1.35 million.

Although government sources are reluctant to predict any appreciable easing of money at least in the first half of next year, they point to two 1959 pressures which should ease in the second half: Need for federal financing and need for industry inventory accumulation.

Here's a rundown of the outlook

Where Construction Money Goes

(In millions)

Type of Construction	1960*	1959*	1958†
Private construction	$38,800	$37,800	$33,491
Residential buildings (nonfarm)	21,500	22,150	18,047
Industrial	2,450	1,950	2,382
Commercial	4,450	3,850	3,589
Other nonresidential buildings	3,300	2,800	2,704
Farm construction	1,550	1,750	1,475
Public utilities	5,350	5,100	5,105
All other private	200	200	189
Public construction	16,500	16,200	15,412
Residential buildings	900	1,000	846
Nonresidential buildings	4,725	4,500	4,653
Military facilities	1,375	1,490	1,402
Highways	5,700	5,800	5,500
Sewer and water systems	1,625	1,465	1,387
All other	2,175	1,945	1,624
Total	$55,300	$54,000	$48,903

†Bureau of Census.
*Estimated by BDSA.
Source: Commerce Department.

of the other major segments of the construction picture:

• **Commercial Construction** — Office buildings and warehouses will reverse the 1959 downtrend because of the projects started this year which will carry well into 1960. For the first time, stores, restaurants, and garages will account for outlays of over $2 billion.

• **Farm Construction** — Expenditures tend to follow farm income and will continue the downtrend of 1959.

• **Public Construction** — Electric light and power industry has just completed major expansions, but the gas industry construction plans (see Page 191) will swing upward and probably hit a new peak in 1960.

• **Highway Construction** — The largest sector of public construction, highway outlays will generally approximate this year's record $5.8 billion. Association of General Contractors officials say the figure could hit $6 billion, but public work projects are always subject to revision by government.

• **Sewer and Water Works**—Spending here is related to housing construction and 1959's favorable housing program will benefit this segment in 1960.

Westinghouse Ups Wages

About 100,000 employees of Westinghouse Electric Corp. will get a pay increase of either 1 cent an hour or 0.5 per cent of 1955 rates as a result of the rise in the cost of living index reported Nov. 25 by the Bureau of Labor Statistics. The jump will up the company's employment costs by $2.6 million a year.

The boost, plus previous adjustments, adds either 21 cents an hour or 10.5 per cent to the base pay since October, 1955, when the cost of living provision was inaugurated at Westinghouse.

U.S. Firms to Build Turkish Steel Mill

Blaw-Knox Co., Koppers Co., and Westinghouse Electric International Corp. have signed a letter of intent with the Turkish government to build an integrated steel plant. The equipment and engineering service will cost about $144 million.

The mill (to be built in Eregli, northwest of Ankara on the Black Sea) is scheduled to begin production in 1963 at an annual rate of 121,000 tons of ingots and about 294,000 tons of flat rolled products. (The total includes about 55,000 tons of tin plate.)

Plans call for expanding the mill's annual ingot capacity to about 1.1 million tons and to process its own raw steel. Initial ingot production is slated to supply the country's only mill (in Karabuk) which produces structural products.

Blaw-Knox will supply mechanical apparatus for the major rolling mills and process lines, including a combination, two high and four high reversing mill with a speed of 3000 feet per minute. Addition of a fifth stand will increase the speed to 4000 fpm.

Koppers will provide engineering and construction services and will supply the blast furnaces, coke ovens, oxygen converters, and various steelmaking facilities.

Westinghouse will provide all electrical equipment, including main drives (8000 hp) for the rolling mill, as well as a complete 20,000 kilowatt powerplant.

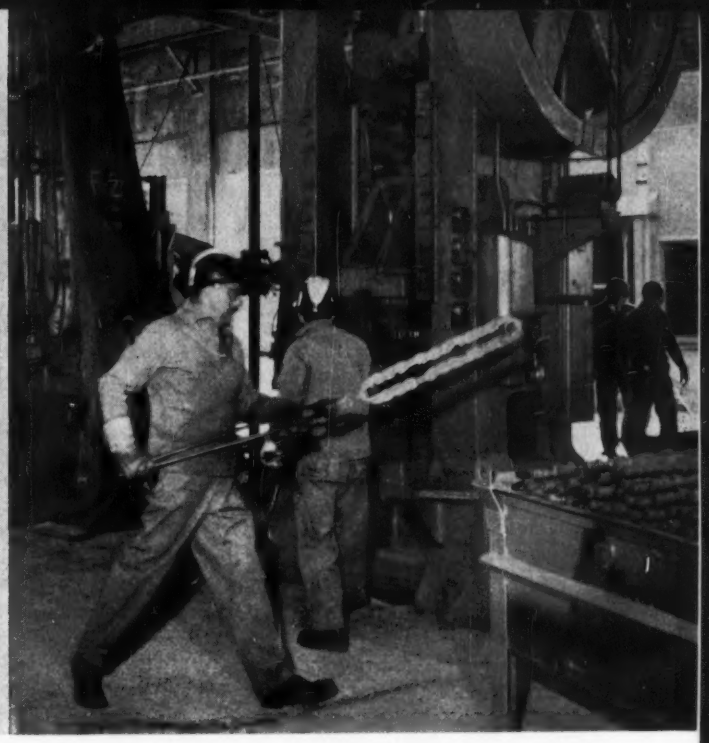
The over-all project will cost $185 million; part of the money will be borrowed from U. S. government agencies. The $41 million not used to purchase the capital equipment is to be raised inside Turkey and spent there for local labor and construction materials.

Steel Production Rising

(Thousands of ingot tons)

	1957	1965*
Argentina	200	1,572
Brazil	1,470	4,297
Chile	388	650
Colombia	125	300
Mexico	1,050	2,000
Peru		130
Venezuela	45	870
Other countries		200
Totals	3,278	10,019

*Estimated.
Source: Comision Economica para America Latina.



Drop hammers from Steel Improvement & Forge Co., Cleveland, operating at the new Cordoba, Argentina, Forge Div., Industrias Kaiser Argentina. Sifco also supplied equipment for a plant in Sao Paulo, Brazil, which opened in August

Latin America Gets Set for '60s

SIGN OF THE TIMES: Representatives of 28 Latin American steel corporations from eight countries met in Santiago de Chile last September to form the Latin American Iron & Steel Federation. Object: To establish a system to co-ordinate their industry for more dynamic and harmonious growth.

• **Steel Spirals** — Authoritative sources see Latin American steel production reaching 5.5 million tons next year, about 64 per cent greater than last year's output. About 3.3 million tons were produced in 1957. Output of finished steel products satisfied but 53 per cent of the 5.6 million ton domestic demand in '57. About 3 million tons will be imported this year.

Gross national product (GNP) rose 3 per cent last year compared with a 5 per cent boost in 1957, the Latins' best year. Per capita increase of GNP is low because of the rapid population increase (it's figured at 2.5 per cent annually).

The oil industry and its suppliers, chemicals, and exploitation of other natural resources are growing fields which show great promise as metalworking markets. As the region becomes more urbanized and "yankeefied," consumers are demanding a wider variety of goods, foods, and services. Electrical goods, particularly commercial air conditioning and refrigeration, are moving well. Auto and replacement part sales are up. Television, where available, is gaining wide acceptance.

• **Problems Present**—Even though our southern neighbors are driving forward, many problems lie on the road to tomorrow. Since 1950, exports have risen 3 per cent while the level of world trade has jumped 7 per cent. Foreign investments have expanded, permitting imports to increase over 3 per cent a year (although there was a decline in foreign investments this year, especially in oil and mining). However, some of the increase has been financed at the expense of cutting down gold and foreign exchange reserves. Inflation, due to the supply of money rising faster than the economic activity and, in many instances, budget deficits, has plagued many Latin nations.

Trade has not fully recovered from the general slackening in 1958. Exports (primarily agricultural goods, oil, ores, and metals) dropped from over $8.6 billion in 1957 to $8.2 billion last year, or 6 per cent. A 2 per cent recovery was reported for the first half. Exports to the U. S. are slightly ahead of last year's for the first nine months of 1959 (2.8 billion vs. 2.6 billion tons). Imports declined 10 per cent in the first half from the $9.3 billion in the forepart of 1958.

Imports from the U. S., chiefly fabricated products, were valued at $2.7 billion for the first nine months this year compared with $3.1 bil-

Being Good Neighbor to Latins Will Pay Off

SOUTH AMERICA, like many underdeveloped areas, offers good, long term growth opportunities for firms not looking for big profits in the short terms, says Steve Girard, president of Willys Motors Inc., part of the internationally minded Kaiser empire.

"Going into the Industrias Kaiser of Argentina venture presented several opportunities," he points out:

- "In the postwar period we felt that our Jeep—with its tremendous reputation left over from World War II—was not selling well enough in the underdeveloped countries where it was an ideal product.
- "We had surplus equipment—a try at introducing new passenger cars (Kaiser Manhattan and Willys Aero) in this country failed.
- "Argentina wanted to develop its own industries. This looked like a good partnership possibility because we didn't have enough money to start a new plant."

Willys took the same dies and presses it used for the Manhattan and shipped them to Cordoba, the Argentina plant site, in early 1955. Less than a year later the first car was produced.

Today, IKA is one of Argentina's biggest industries, employing over 5600.

More than 54,000 Jeep utility wagons, trucks, and Kaiser Carabela passenger cars have been produced. Next year's target: 50,000.

- **IKA's Ownership**—Only 30 per cent of IKA stock is owned by Willys. Renault Motor Co. (France) owns 8 per cent—it invested dies and stamping equipment. Steel Improvement & Forge, Cleveland, shipped in machinery to start a forging plant in exchange for 3 per cent of the stock. The Argentina Air Force (for which some vehicles are built, owns 14 per cent, and the remaining 45 per cent is owned by the Argentine public.

"In most of the underdeveloped countries," says Mr. Girard, "machinery and knowhow are needed more than dollars—wherever we've been there has been adequate capital for buildings.

"I think it's time American firms accepted their responsibility of being an extension of the government's foreign policy. Helping to improve the living standard in these countries will pay off in the long run. The advantages of appreciation of investment are obvious."

STEVE GIRARD

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lion for the same period in 1958. One bank official says it appears that, under present conditions, exports will not be expanded rapidly enough to meet import needs.

Although the U. S. is the biggest exporter to Latin America, European and Japanese firms have enlarged their piece of the pie by about 10 per cent since 1950. They now account for about 30 per cent of the area's imports. Most of the gains were made at our expense. Reasons: The same as those which have caused foreign goods to attain wider acceptance in this country. We still have one big advantage: Speedy delivery.

- **Foreign Funds**—More foreign investors are sinking capital into Latin enterprises. German and Japanese firms are leading the parade. About 20 per cent of Germany's private foreign investments are reported to be in Brazil. Even Yugoslavia is in the act. A trade mission from that country followed exploratory trips by the French and British. Local banks are doing more business financing too. Domestic savings are on the increase. Mexico has been especially successful in managing it own financing. Native industrialists are doing well and investing profits intelligently.

The political picture in Latin nations is often uncertain. Most businessmen have learned to live with it. But people are afraid to buy government bonds for fear of political change. Communist activity is said to be on the upswing.

- **Communities Conjectured**—There's much talk of economic communities similar to the European Common Market being formed by South American nations. Due to internal problems, some observers feel it may be five to ten years before a fully integrated move is developed. Others believe the possibilities are greatly exaggerated. Reason: Small countries tend to be more stable. Such a move would provide advantages only to a certain group within the economy. But a treaty setting up a Central American Union has already been signed by Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. Two others are under consideration:

1. Columbia, Ecuador, Peru, and Venezuela.
2. Argentina, Brazil, Chile, and possibly Bolivia, Paraguay, and Uruguay.

Unemployment is no problem. There's a worker shortage. The new Iron & Steel Institute will attempt to alleviate the acute skilled worker shortage by setting up training programs.

• **Big Block**—The basic problem in Latin America is that too many countries depend on one or two commodities. Some observers believe their political institutions lack the framework necessary to keep going and provide the means for continued economic growth. Even in prosperous times, they've failed to follow through in development of present and new industries. Inadequate transportation is also a bottleneck.

Here's a brief rundown of the major activities of interest to metalworking in the leading Latin American nations:

• **Argentina** — The country still must implement a successful economic reform program to take advantage of the nation's rich resources. Nevertheless, the mining, automotive, electrical, and tire industries are attracting much interest from foreign investors. Money and credit remain tight, although the inflationary surge has subsided.

The country imports 44 per cent of its steel needs. Over $280 million is going into an integrated steel facility at San Nicolas on the Parana River. Anticipated annual capacity: 1.8 million tons. About 85 per cent of Argentina's steel market, which is expected to use 1.8 million tons of steel this year (1958: 1.1 million tons), is within 150 miles of the plant. Pig iron production should start next year. The first steel will be poured in 1961.

Kaiser Aluminum International and Guillermo Decker SA, a major South American manufacturer of nonferrous metal products, are organizing an aluminum fabricating company to make mill products for the building, consumer durable, container, and transportation industries. Some production will start next year with full operation scheduled for 1961.

As in many Latin nations, oil production is up. First half output was up 29 per cent over the same period last year.

• **Brazil**—Low coffee prices have adversely affected the nation's economy, but with vast untapped reservoirs of vital materials, Brazil appears destined to become a great industrial power. Its progress is likened to that of the early U. S.: The Indians are being pushed west and development is being aided by a large influx of immigrants.

Brazil, Latin America's leading steel producer, imports about 17 per cent of its requirements. Ingot production is expected to top 1.9 million tons this year, 2.2 million tons next year, and 3.9 million tons by 1962. Various sections of the Usiminas steel plant at Ipatinga are expected to be completed between 1961 and 1964. Limited construction began in September. Fourteen Japanese firms are contributing 40 per cent of the capital. Work may begin soon on a steel plant at Vitoria. Sponsored by two German firms, the plant's initial annual capacity will permit production of 137,000 tons of bars, reinforcing rounds, and wire rods. Capacity will later be upped to 275,000 tons. Mannesmann AG, Dusseldorf, Germany, is doubling the capacity of its seamless pipe and tubing plant at Bela Horizante to 200,000 tons annually. Kaiser engineers are assisting in the construction of a $170 million integrated steel facility at Piacaguera. Initial annual capacity: 660,000 ingot tons. Ultimate production goal: 2.8 million tons a year.

The motor vehicle business is booming. At least 150,000 cars and trucks are expected to be assembled this year. The 1960 estimate is 210,000 vehicles. The industry now uses 350,000 tons of steel annually. Willys Overland do Brasil, under an agreement with Renault of France, will begin producing Dauphines. By October, 1961, 95 per cent of the parts used in the car will be wholly or partially built in Brazil.

Perkins Ltd., Peterborough, England, will start production of six cylinder diesel engines in Brazil next year. Cummins Engine Co., Columbus, Ind., will also build a plant in the country. A $4.5 million transmission plant was opened at Valinhos this year by Clark Equipment Co., Buchanan, Mich.

• **Chile**—Chile is the only country in the region which exported finished steel products in 1957. In the first seven months of this year, copper production reached a record 406,000 tons. Iron ore may replace nitrates as Chile's second largest export commodity in 1960.

• **Mexico** — Manufacturing in the most diversified country in the group has jumped 70 per cent since 1950. Raw steel production near 3.2 million tons by 1965 is predicted, a 1.9 million ton increase over the 1958 level. But that rate still won't supply Mexico's anticipated requirements of 3.8 million tons. This year's production is said to be 14 per cent over 1958 levels. Altos Hornos, the partly nationalized steel firm, says it will boost steel production to 430,000 tons this year, 22 per cent over 1958.

The world's largest plant for the reduction of iron ore to sponge iron is going up at Monterrey. Capacity: 500 tons daily. Production is scheduled for early next year. The plant was designed and is being built by M. W. Kellogg Co., New York, for Fierro Esponja, an affiliate of Hojalata y Lamina, a major Mexican steel producer. The facility is next to a 200-ton-a-day Fierro Esponja plant which went into operation last year.

The nation's first aluminum smelter (annual capacity: 22,000 tons) is going up at Veracruz. Cost: $20 million. The project is a joint effort between two Mexican and two European firms and Aluminum Co. of America.

• **Peru**—Iron ore exports reached 2.5 million tons in the first eight months of this year. The Acari iron ore mine, owned by Pan American Commodities SA, opened this year and is now putting out 5000 tons daily. By next year, the Southern Peru Copper Corp.'s mines at Toquepala should be producing 30,000 tons daily.

• **Venezuela**—Venezuela, which has the highest per capita income in Latin America, imports nearly all of its steel needs. But a national steel plant on the Orinoco River at Matanzas is under construction. Initial production will be seamless pipe for the petroleum industry and some wire and related products. Eventual capacity: 1.2 million tons yearly. The Bureau of Iron and Steel is attempting to promote raw material development and construction of metalworking operations. Iron ore is already an important product.

In January, the first 108 miles of a 2640 mile railroad, to be built over the next 20 years at a cost of $1.2 billion, was put in operation.

EDITORS' NOTE

In the midst of the turmoil over labor relations in steel, the editors of STEEL thought its readers would welcome a change of pace, to learn how the problem is handled elsewhere. We'll look at General Electric Co.'s approach because:

1. Its program has shown promise.
2. It can be objective now because the contract with its major union, the AFL-CIO Electrical Workers, doesn't expire until Oct. 1, 1960.

Marketing Methods Sell Labor on GE

GENERAL ELECTRIC CO. regards union officials as the professional representatives of employees, just as lawyers represent clients.

The premise is incorporated into its bargaining procedures. Example: When the union representatives have had their say at the negotiating table (just as a customer may complete its case for different terms or conditions affecting a GE product), the company comes in with its offer or proposition. "It contains all that the company believes is indicated in the balanced best interest of employees, owners, customers, other interested businessmen, and general citizens," says Vice President Lemuel R. Boulware, chief architect of the industrial relations policy.

GE also puts in writing: "This is all we see now that can be done. Upon any evidence from any source that the offer should be changed in the balanced interests of all concerned, GE will reconsider."

Except for the 1948 settlement when union officials were so surprised by the completeness of the company's offer that they accepted it practically unchanged, all proposals have been changed some.

● **Why Union Leaders Object**—Most labor officials complain loudly about GE and about what they call "Boulwareism" because:

1. The company communicates with its employees the year around.
2. The company publicizes any offer after it's made to the union representatives during bargaining.

Lemuel R. Boulware is chief architect of GE's industrial relations policy

3. The company puts all the terms on the table at once.

That last objection, says Mr. Boulware, is typical. Union officials too generally want GE to help them deceive the workers into thinking that the union has dragged the last penny, the last benefit from recalcitrant management.

● **Filling a Void**—"Skillful propaganda by certain union officials and other of our critics has filled the communication void created by our traditional reluctance to speak up about our good intentions and performance," Mr. Boulware points out. "That has prevented too many people from recognizing the growing gap between the thoroughly good theory and potentiality of unions and the too frequently bad ideas, practices, and proposals of certain unions we had to deal with.

"Regardless of how untrue it is, some union individuals sell every improvement in employee welfare as something which we had greedily resisted and which had to be forced out of us unwillingly."

● **Unions' Role**—Too many union agents do little but preach hatred, charges GE's vice president. "Union representatives are not giving us enough help in trying to arrive at the best kind of contractual arrangement for employees. The unions are too busy being political."

He adds: "In the long run, union members must force their leaders to operate in the proper area. And we so advise our workers."

● **Program Is Born**—GE's approach got its start in 1947.

Mr. Boulware, who had had considerable marketing experience but was then manager of GE's wholly owned subsidiaries, was given the job of returning GE to a businesslike approach in labor relations.

● **Chinese Copy** — The philosophy developed then is still the basis for GE's industrial relations. It has been called radical, but the vice president describes it as "so com-

pletely orthodox that it is dull. It is no invention, but a Chinese copy of any traditional, proved consumer goods marketing program."

A bitter strike GE suffered in 1946 opened management's eyes to the fact that many of its employees and neighbors didn't believe the company's intentions and practices were as good as they should and could be. It did have the approval of its customers, shareholders, and other interested businessmen (such as suppliers and distributors of GE products). Why was it scoring with three groups but not the other two? Mr. Boulware's answer: The three successes stemmed from good research, product planning, and selling, the two failures from inadequate marketing. That's why GE's employees and neighbor relations program is designed first to deserve and then to achieve approval for the company by employees and neighbors.

• **The Three Needs** — "We have found what everybody finds in product marketing," says Mr. Boulware. "It is that the customer—in one way or another—wants three things: Basic material values (efficiency, reliability, competitive price); extra human satisfaction (comfort, convenience, distinction); and assurance (of no robbing Peter to pay Paul, of fairness). The other groups want comparable things.

"When we went to ask our employees what they wanted on a two - way, something-for-something basis in return for their interest, skill, care, and effort," recalls Mr. Boulware, they replied: "1. The basic material reward to come voluntarily and amount to what's right in pay, benefits, physical working conditions. 2. The extra human satisfactions in important work, respect for dignity, full information as to what's going on and what's ahead, participation and recognition, and gratifying two-way, man-to-man association with supervisors and fellow employees. 3. The assurance that the good jobs with good pay and other attractions are the result of efficiency and not of any shortchanging of customers, suppliers, distribution people, owners, or citizens."

• **Employee Research** — GE found

Report to Employees: One Way General Electric Communicates

Results of the first nine months show . . .

More Progress that Helps Build Jobs

The figures that reflect the results of our efforts during the first nine months of 1959 are good news. Employee pay and benefits have swept upward, are $73,171,000 higher than last year at this time. Other figures are good news too.

For instance:

Sales are at near record levels—5 per cent higher than last year at this time.

Company earnings set a record—they're $27,542,000 higher than they were last year at this time.

What do increased sales and profits mean?

Increased sales help build the security of our jobs today—help build still more and better jobs for tomorrow.

Increased earnings help provide funds to plow back into our business for future research, development, and facilities—vital tools that help us meet competition and provide values that will win us still more customers.

Here is how the money paid to us by customers was divided:

	1959 Nine Month Totals (Millions of dollars)	Cents from Each Sales Dollar
GOVERNMENT . . . For direct taxes.	255	8
SUPPLIES . . . . . 45,000 suppliers received from us $1,400 million for materials, supplies, and services produced by the suppliers' facilities and employees. Included in the $1,400 million were many millions for indirect taxes. Such items as depreciation, net interest, inventory changes, and employment costs directly reimbursed by the Atomic Energy Commission account for the remaining $9 million.	1,409	45
EMPLOYEES . . . . . Compensation (including pay and benefits) for our care, skill, and effort.	1,288	41
SHARE OWNERS . . To more than 404,000 share owners of record—for the risk and use of their savings on our facilities and jobs—$131 million went in dividends, while $59 million was reinvested in the strength and growth of the company.	190	6
CUSTOMERS . . . . . Millions of them—paid us for goods valued at that sum.	3,142	100

The challenge ahead is for each of us, in our individual jobs, to keep on doing the kind of work that will please our present customers and win us more of them. That's where sales and jobs come from.

what its people wanted through employee research, just as it would use marketing research to learn what customers want. Its supervisors are the salesmen on a face-to-face basis. Its bulletin board announcements, employee letters, and newspaper ads are part of the mass selling approach that parallels the mass product marketing methods of media advertising and direct mail.

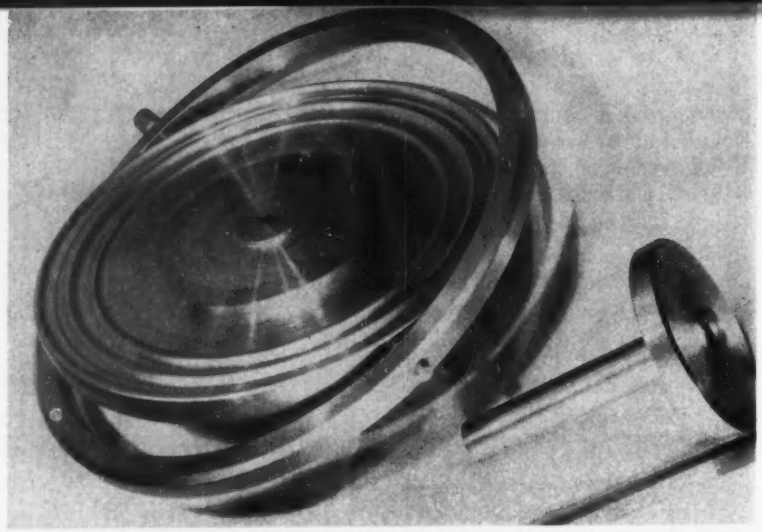
GE's mass approach to selling employees has attracted the most attention because the company speaks about controversial subjects. "But this too is orthodox," claims Mr. Boulware. "We're selling our beliefs and our good conduct. If we didn't discuss the controversial, we would not be talking about what most people are interested in."

• **Economic Facts of Life**—To implement its program of communicating about the controversial, GE soon found that it had to try to teach economics. As a result, practically all company employees attended basic economics courses on company time to learn where the dollars go. It also tries to teach GE's real intentions through two-way communications between supervisors and employees.

In particular, it shows workers it's trying to give them: Good pay and other material benefits, good working conditions, good bosses, a fair chance to get ahead, steady work, respectful treatment, full information, important and significant work, and rewarding associations on the job.

• **For the Community Too**—Doing all that with employees was not enough. The company discovered it had to explain matters to the community too. Nonemployees in GE areas influence GE people.

As time went on, the company broadened its information program even further to include attempts to discuss with all concerned many issues that affect GE. The central aim: Show that GE is not one but many. For example, the company makes it clear that customers pay the taxes, the wages, and all other expenses. The owners don't pay them. Inflation, pricing out of the market, foreign competition, technology are among the perennial questions being discussed with employees and the citizens.



TOP: Closed die forgings made of Astroloy, a new high temperature alloy

BOTTOM: A missile motor casing closure of B120VCA all beta titanium alloy

New Forgings Aid Rocketry

ADVANCES in rocketry through superalloy forgings were promised by Wyman-Gordon Co., Worcester, Mass., at the Eastern National Astronautical Exposition in Washington.

To back its claim, the company introduced forgings produced on a 35,000 ton, closed die press at the Wyman-Gordon-U. S. Air Force plant, North Grafton, Mass. They're made of Astroloy, a rare, high temperature superalloy with 12 components, including high nickel, chromium, and cobalt contents. It is no more difficult to machine than Rene 41 and has a 132,000 psi yield (typical) at 1400° F, reports M. E. Cieslicki, R&D director.

Significance: Operating temperatures of jet engine and missile parts made of Astroloy can be increased up to 200° F, boosting power and payload, states Mr. Cieslicki. He adds: We can guarantee minimum properties up to 40 in. in diameter.

Also shown were missile motor casing closures forged from B120VCA all beta titanium. The alloy, as forged at Wyman-Gordon, develops 180,000 to 200,000 psi strength yield with 4 to 6 per cent elongation. At the 180,000 psi strength level, B120VCA is equivalent to steel at 290,000 psi yield on a strength to density basis.

Industry Fires First Salvos In Fight for Workers' Vote

THE BIG CAMPAIGN for the workers' vote in the steel negotiations is on. All the stoppers were pulled last week.

U. S. Steel Corp. mailed an eight page brochure to employees' homes. It outlines the industry's Nov. 15th offer (see STEEL, Nov. 30, p. 59) which Steelworker President David J. McDonald rejected.

Most other companies had similar plans underway.

Indications were that companies were also readying a campaign for the general public via newspapers, radio, and television.

• **Union Is Busy**—Mr. McDonald was getting in his licks too. *Steel Labor*, official USW publication, got out a "special report" issue. It highlighted STEEL magazine's Nov. 16 editorial by Editor Walter J. Campbell, which urged industry to take its story to its workers, their wives, and neighbors. "Don't Be Fooled By Corporation Propaganda," was the red-lettered headline on the two-page spread in the union publication.

In Chicago, Joseph Germano, director of the UAW's largest district, proposed that future negotiations be held in Chicago and be open to the public. "If need be, rent the Chicago Stadium," he suggested.

Because of the U. S. Steel brochure, Mr. McDonald charged the steel companies with bad faith in continuing negotiations under the auspices of the Federal Mediation & Conciliation Service. Mediator Joseph F. Finnegan called the two parties together on Dec. 1, the first time they had met since Nov. 15.

• **Interim Agreement** — After a "most of the night" session, Lukens Steel Co. announced Wednesday morning that it had reached an interim agreement with the USW, which would keep the plant operating in the event of another walkout.

The agreement provided for settlement on local issues and inclusion in a final agreement the wages and benefits that will result from the settlement of the major industry contracts. Up to STEEL's presstime, the union locals had not ratified the proposal.

The development triggered speculation that other smaller steel firms which do not consider work rules a serious issue might follow suit. On the question of retroactivity of any wage gains, Lukens said that wages and benefits would be retroactive only if the major contracts were.

• **More from Dave** — Mr. McDonald charged that the U. S. Steel brochure served notice to the workers that it didn't intend to continue bargaining. He also argued that the offer was a carbon of an Oct. 17 proposal which the USW's Wage Policy Committee had vetoed.

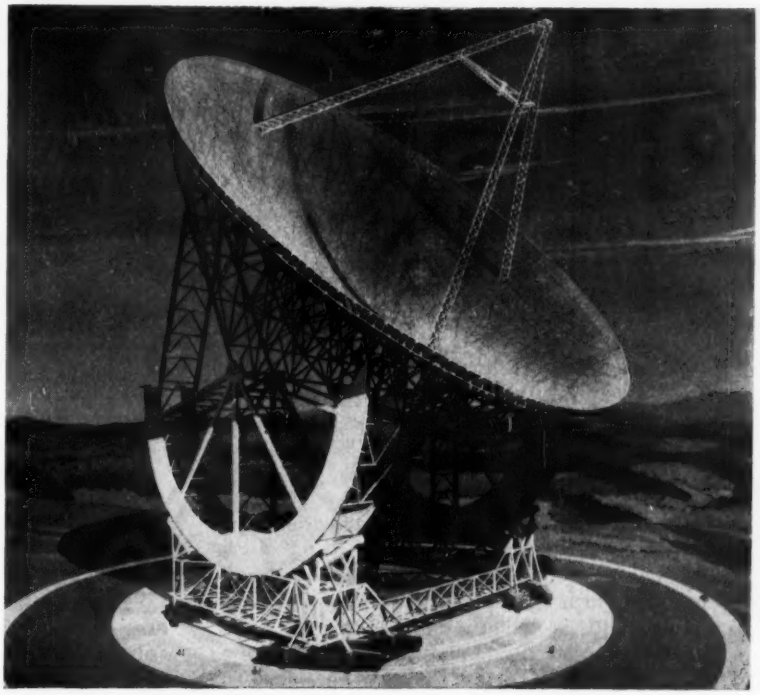
Actually, the Nov. 15 proposal contained at least two important changes: A maximum cost-of-living adjustment of 8 cents was proposed. The offer also included the submission of the work rules question to study by a union-management committee. The issue would go to binding arbitration if the committee could not agree by June 30, 1960.

• **Cooper Speaks** — R. Conrad Cooper, in responding to the question of whether the industry would improve upon the offer before a National Labor Relations Board vote, said this:

"If by improve, you mean increase the offer, we will not do it. This is the offer that may be submitted to employees for vote. It is a fair offer. It is as much as can be offered without inflationary increases in the cost of producing steel."

The campaign for votes got off in a flurry. The industry was standing pat: It would not increase the value of the package offer.

Many felt it was time for a union counteroffer.



A RADIO TELESCOPE WITH A 600 FT ALUMINUM MESH DISH, as shown in this artist's sketch, will be built for the Navy to bring in signals from astral bodies up to 38 million light years away. Costing about $79 million, it will occupy 7 acres at the Naval Research Laboratory, Sugar Grove, W. Va. Completion is scheduled in 1962. The Bureau of Yards & Docks is acting for the Navy as contracting agent. Design is being handled by Grad, Urbahn & Seelye, New York

Buy American Reform Coming?

AN IMPORTANT aspect of inner circle debates over the fiscal 1961 budget: Certain Capitol Hill legislators see the need to limit the flow of federal dollars overseas.

The pendulum of foreign economic policy is rebounding from the Marshall Plan. Example: The directive recently issued by the chief of the Development Loan Fund (DLF) calling for the maximum possible expenditure of DLF funds with American companies. A similar policy is almost at hand for the International Cooperation Administration, if you can believe the Washington rumor mill.

The situation raises the basic question: Will President Eisenhower's budget message to Congress in January recognize either: 1. The need for helping U. S. firms obtain more federal dollars. 2. The political necessity of stemming the flow of U. S. dollars abroad, while domestic firms flounder in a sea of imports?

It can be safely predicted that competition from foreign producers will be an important issue of the 1960 campaign.

Gold Drain Is Serious

The Buy American issue will be formalized by economists in terms of the drain on U. S. gold. In the last decade, we have allowed $5 billion worth to leave this country. Much of it has gone to Western Europe, coincidental with its fantastic postwar rebirth.

Now the Republican administration is attempting to offset import damage by increasing exports. The DLF decision can at most amount to $200 million a year in business for U. S. firms, informed sources estimate. That compares with over $500 million of DLF funds yet uncommitted to loans overseas.

Working with the President is the trend to more exports as we continue to recover from the 1958 recession. If the trend continues, Ike may not be forced to ask Congress to revise the Buy American Act which governs the federal government's purchases abroad.

Congress Could Take the Lead

Of course, Ike may not have the chance to make the decision for himself. Congressmen like Rep. Richard M. Simpson (R., Pa.) minority leader of the Ways & Means Committee, are incensed over the issue.

Industry (represented by a few firms like Baldwin-Lima-Hamilton Corp., Philadelphia) has been taking its case to anyone in government who will listen. B-L-H thinks the 6 per cent differential allowed between foreign and domestic bids for government contracts is illogical, even illegal. Reason: Western Europe's and Japan's lower labor costs.

The firm's appeal to the U. S. comptroller general was turned down last month. That leaves the issue squarely up to Ike or Congress.

Surplus to Nonprofit Groups?

Church groups, particularly, would benefit from a new plan being discussed in Washington to rid Uncle Sam of the millions of dollars worth of surplus property still held overseas.

The equipment includes fully equipped hospitals, jeeps, typewriters, portable electric generators, radios, telephones, and electronic equipment. Reportedly, the material would be disposed of at a "token" price.

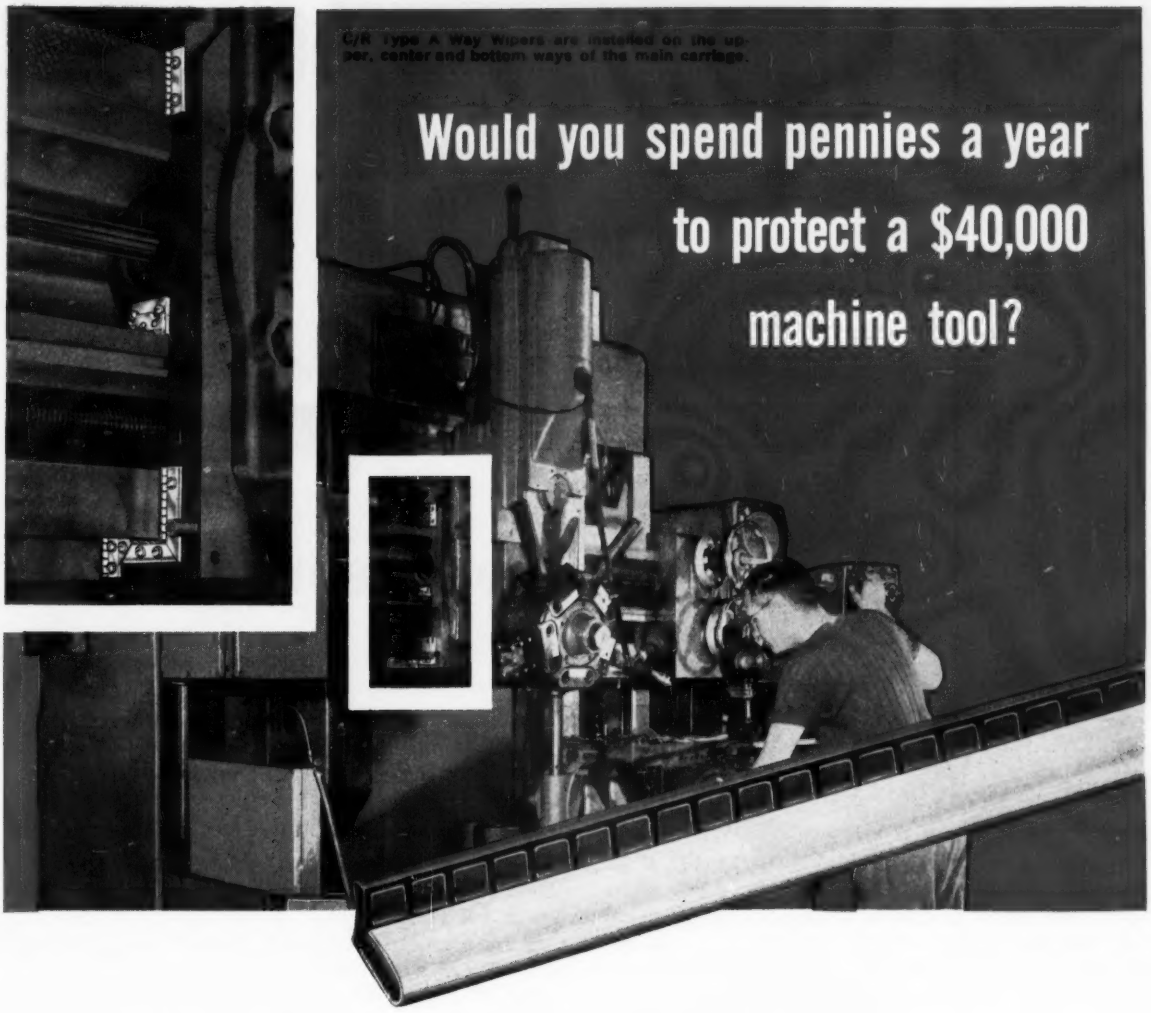
Small Business Memos

The Small Business Administration has O.K.'d operations of investment companies (licensed under the SBA) to finance overseas business of small firms, so long as "a major portion" of their activities is under the jurisdiction of the U. S.

The Defense Department's small business subcontracting program will become mandatory for all future prime contract awards amounting to more than $1 million. It will also apply to subcontractors of the primes who do subcontracting themselves. In the past, the program has been voluntary. It amounts to encouragement by the Pentagon to subcontract to small firms: Primes participating have reported periodically on the amount of work they sent to small business.

Moves Toward Single Managers

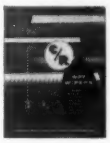
Buying by the armed forces has been criticized for years as wasteful. Partly in answer to those charges, the Pentagon named the Army as single manager for all services for subsistence, clothing, and traffic management in 1956. At the same time, the Navy got the job of buying all petroleum and medical supplies and the Air Force all air transport services. Latest single managerships have gone to the Army for all general supplies, including housekeeping supplies, hand tools, and the like. The Navy received the job of buying all industrial supplies.


C/R Type A Way Wipers are installed on the upper, center and bottom ways of the main carriage.
Would you spend pennies a year to protect a $40,000 machine tool?

C/R Way Wipers prevent scoring, abrasion – save costly hours of master mechanic maintenance

The 36-inch vertical milling machine shown above costs more than $40,000 but it costs only pennies per year to protect its ways with C/R Way Wipers. And they pay for themselves many times over. One user, for example, has eliminated *all* way care and saved 1140 hours of master mechanic maintenance since installing C/R Way Wipers on 6 vertical milling machines. And, after 4560 hours of operation per machine, ways show no signs of scoring or galling. You may be able to realize similar savings in reduced downtime and maintenance in your own shop.

C/R Sirvene (synthetic rubber) Way Wipers are precision molded for accurate fit. They wipe ways clean of dirt, chips, fine abrasives, even water emulsions. They will not trap harmful materials, will not mark or smudge ways. They are easily installed on flat ways, side rails, angles, columns and hydraulic rams, and will save many times their original cost.



For complete details write for our Bulletin WW-100.

CHICAGO RAWHIDE MANUFACTURING COMPANY

SIRVENE DIVISION, 1245 ELSTON AVENUE • CHICAGO 22, ILLINOIS
Offices in 55 principal cities. See your telephone book.
In Canada: Chicago Rawhide Mfg. Co. of Canada, Ltd., Brantford, Ontario
Export Sales: Geon International Corp., Great Neck, New York
C/R PRODUCTS: C/R Shaft & End Face Seals • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic gears

C/R

Inland "job-tailored"
Cold Rolled Sheets work better

product: VACUUM CLEANER TANK PART

problem:

produce a handsome vacuum cleaner tank of the upright type, designed in a silhouette for consumer eye appeal. The operation to be a single deep draw. Because of the depth of the draw and the severe shaping, a sizeable amount of breakage could result. The required draw also produced stretcher strains in the shaped tank which handicapped later finishing operations.

solution:

quality standards were met and the problem overcome by "job-tailored" Inland Cold Rolled, Drawing Quality, Aluminum Killed Steel. This steel, specifically recommended for the job, successfully took the deep draw and pattern formation required. Stretcher strains were eliminated and an excellent surface obtained for all subsequent finishing.

INLAND STEEL

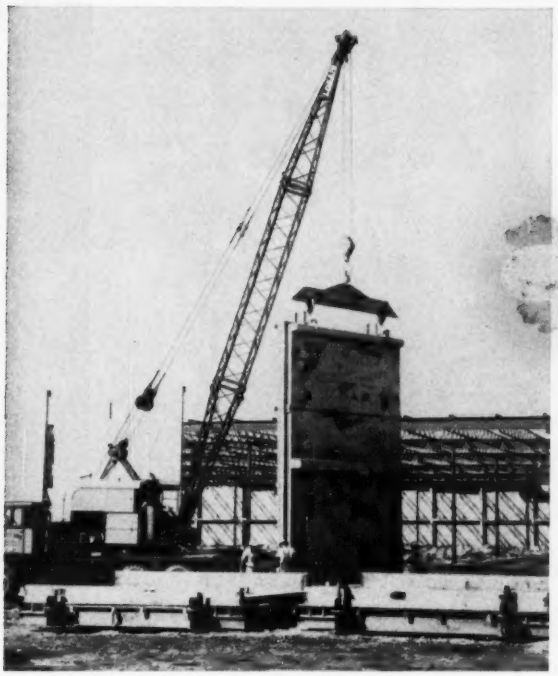
30 West Monroe Street, Chicago 3, Illinois

Sales Offices: Chicago • Davenport • Detroit • Houston • Indianapolis
Kansas City • Milwaukee • New York • St. Louis • St. Paul

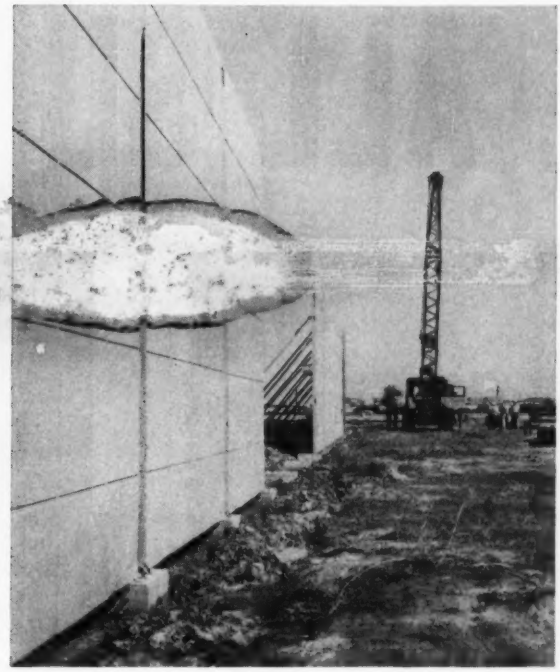
INLAND

Cold Rolled Sheets

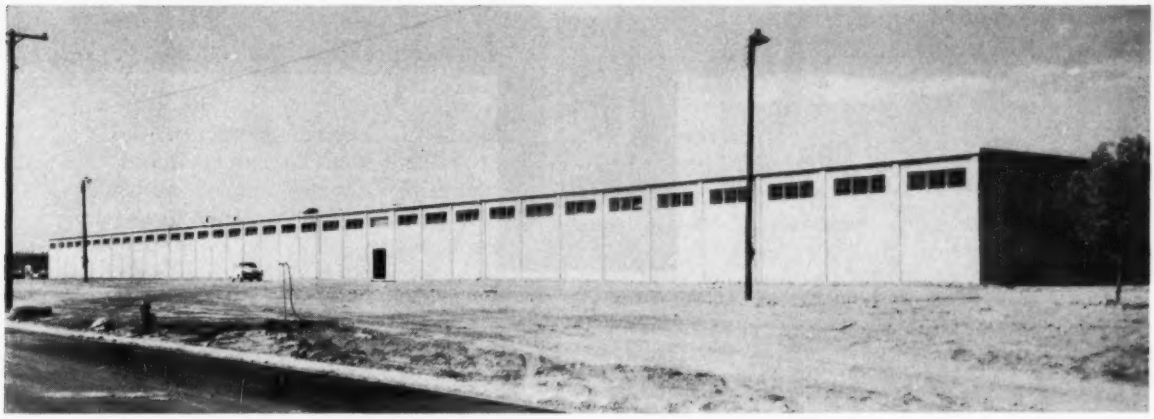
Building Process Whittles Costs



A CONCRETE WALL PANEL is swung into place on piers with frame still intact less than 24 hours after the wall has been poured and the finishers have touched up the exterior. The new Tilt-Frame process of forming and erecting steel reinforcing concrete walls eliminates the necessity for grade beams and floorings to be in place before walls can be set. The process permits flexible design, exterior multicolored design and ready expansion



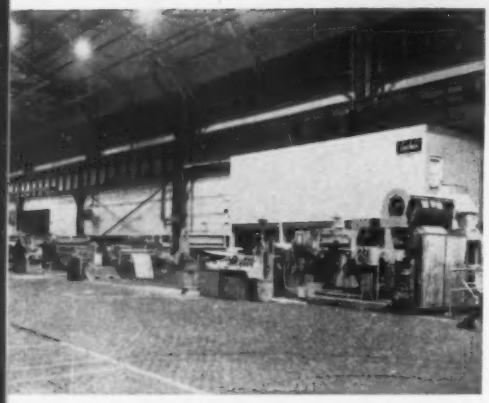
AS WALL IS SET IN PLACE and braced, frame tilts away. Other panels are ready for lifting. Patented frames are positioned on the ground outside the building area. Construction of the wall begins after the piers have been poured. Windows and doors are located in the frames and steel reinforcing bars are positioned for greatest wall strength. Pouring, forming, and erecting can be done with a small crew with a minimum of experience



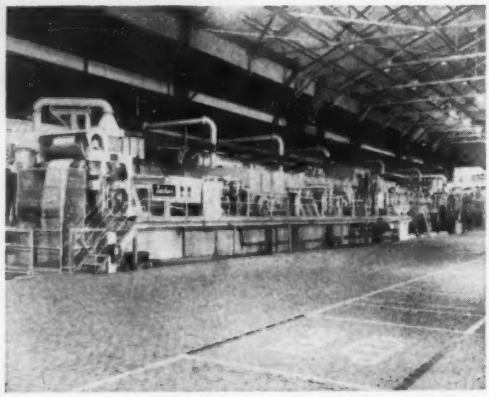
A COMPLETED WAREHOUSE like this 100,000 sq ft one in Richland Industrial Park, Ft. Worth, Tex., can be erected in 11 working days compared with about 60 days for conventional methods. Construction time for 130 lineal feet of wall is only 8 hours. The Garmon Construction Co., Ft. Worth, originator of the Tilt-Frame technique, plans to distribute franchises on an territorial basis throughout the U. S.

complete normalizing line:

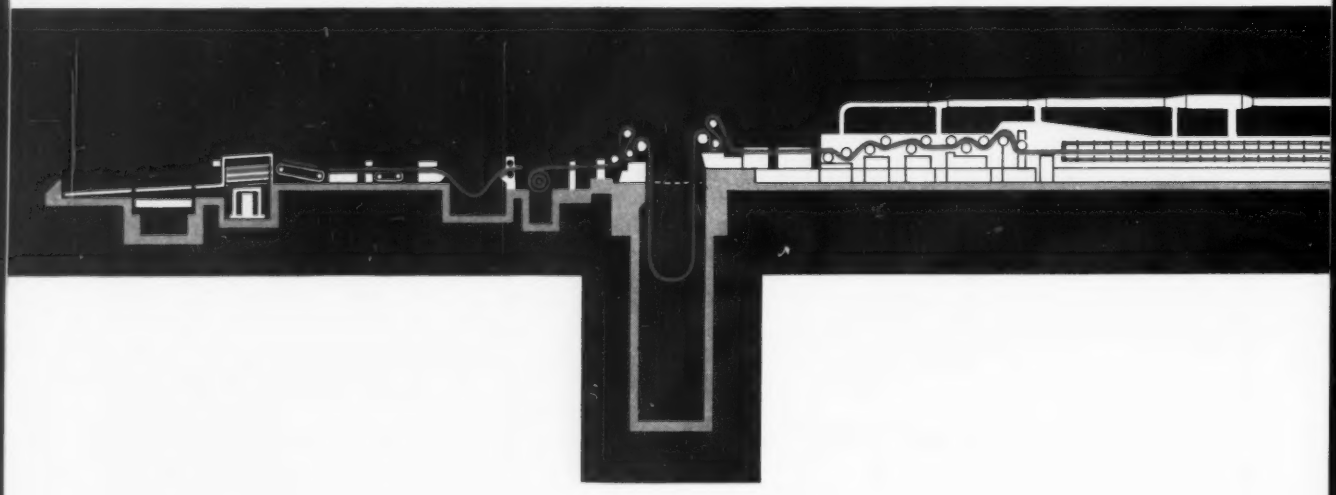
ALL SURFACE!



Exit end of the line, showing looping pit, "recoiler," automatic shear and sheared sheet piler.

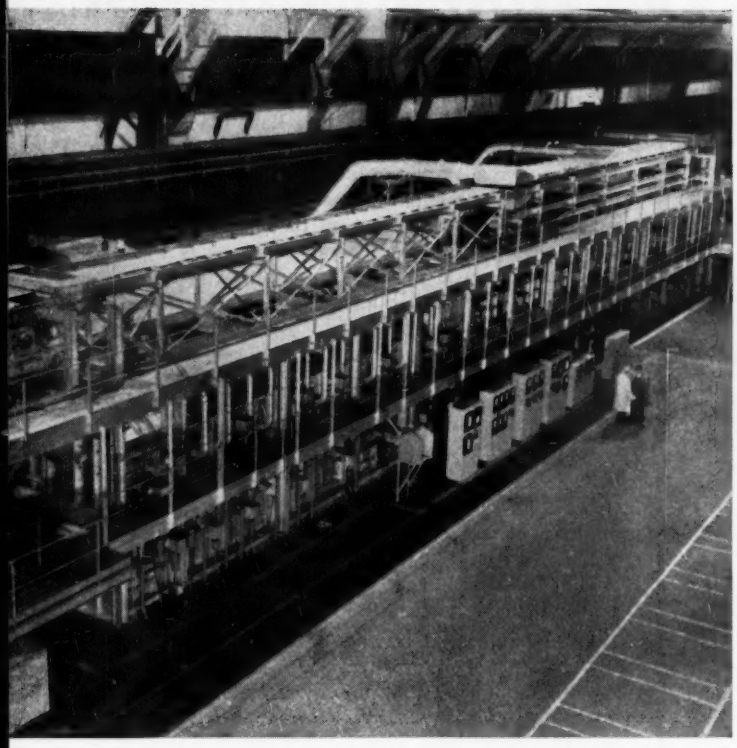


Pickling section includes acid bath, water rinse tank, brush scrubbers, alkali tank and dryer, all installed by Surface. This view shows the exit end of the section.

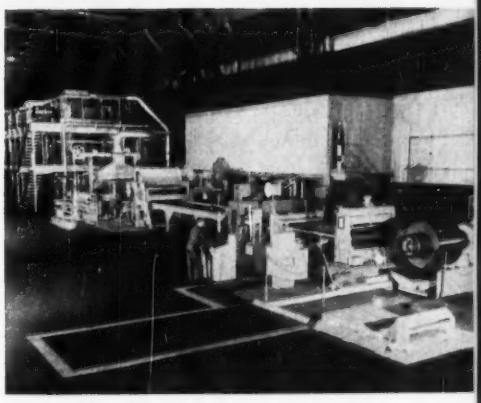


from payoff...to payoff

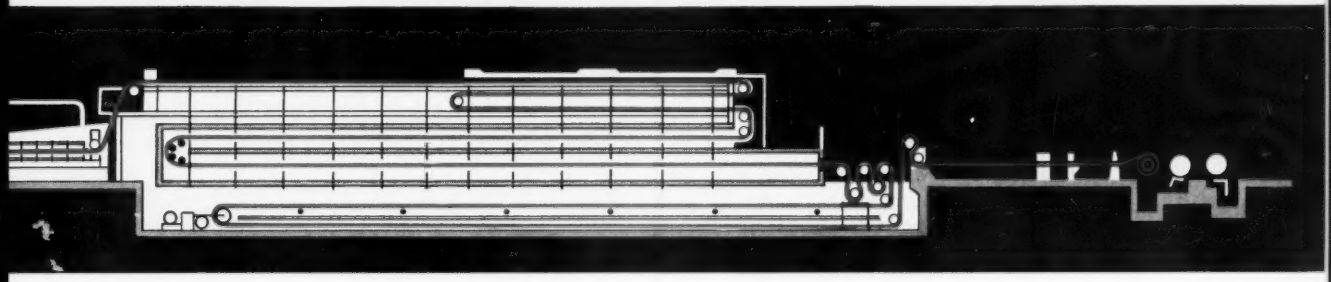
Worldwide engineering and manufacturing facilities through associates in Australia • Belgium • France • Germany • Great Britain • Italy • Japan



Rockwells in the low 40's are achieved consistently in this three-level normalizing furnace. Heating zone is on the lower furnace level; convection cooling in the middle; air blast cooling at the top. A horizontal "looper" is located underneath the furnace.



Payoff reel marks the entry of low carbon stock after cold rolling. Speeds of 150 fpm on 60" wide strip are attained.



This complete new Surface normalizing line for vitreous enamel stock started paying off on its first day of operation. For example, its capacity of 30,000 lbs. an hour puts this mill forcefully into the market for deep draw quality strip. More than adding new selling power, this big line increased productivity per operator by an almost unbelievable amount.

From payoff reel to real payoff, the entire installation is a graphic demonstration of Surface's qualifications as prime contractor. Applying its global experience in metallurgy, combustion, chemistry, and mechanization, Surface engineered and installed the complete line.

Take the opportunity now to evaluate the prime contracting skills available at Surface, and mobilize them for your profit, ***wherever heat is used in industry.***

Surface

SURFACE COMBUSTION CORPORATION *2408 Dorr Street, Toledo 1, Ohio*

Editor's Note: The body of this article points out many ways to improve a work simplification or methods improvement program. But the techniques will be almost useless if your people fail to question the things they do. Your objective is to prevent them from following the proverbial calf path . . .

One day through the primeval wood
A calf walked home as good calves should;
But left a trail all bent askew,
A crooked trail as calves all do.

A dog took up the trail next day
A bear, too, went along that way.
And then a wise bellwether sheep
Pursued the trail o'er vale and steep.

And drew his flock behind him too
As good bellwethers always do.
And from that day, o'er hill and glade
Through those old woods a path was made.

And many men wound in and out
And dodged and turned and bent about.
And uttered words of righteous wrath
Because 'twas such a crooked path.

The forest path became a lane
That bent and turned and bent again.
And this, before men were aware,
Became a city's thoroughfare.

And soon the central street was this
Of a renowned metropolis.
A hundred thousand men were led
By one calf near three centuries dead.

For men are prone to go it blind
Along the calf paths of the mind
And work away from sun to sun
To do what other men have done.

They keep the path a sacred groove
Along which all their lives they move;
But how the wise old wood gods laugh
Who saw the first primeval calf!

How to Upgrade

"WE MUST CONVINCE PEOPLE to work smarter, not harder," declares Allan H. Mogensen, director, Work Simplification Conferences, Lake Placid, N. Y.

That's the philosophy behind work simplification (WS)—a broad program which ferrets out and eliminates waste—of manpower, machines, materials, money, space, effort. WS operates on the theory that the expert on any job, regardless of position, is the man who does it. You get results from that man, not by telling him or selling him, but by consulting him.

Seldom have so many companies latched onto any program with the speed and enthusiasm that they've shown in putting WS to work for them. Hundreds of firms of all sizes in diverse industries are saving thousands of dollars every year by making the employee responsible for, and capable of, policing the efficiency of his own job—through WS.

WS participants are trained to follow a five step approach developed by Mr. Mogensen: 1. Pick a job to improve. 2. Get the facts—such as cost data, time studies, job descriptions. 3. Challenge every detail. 4. Find a better way. 5. Install the improvement.

But the potential benefits of WS are much greater than most companies realize. As with a bank account, you must put something into WS before you can draw anything out. And your rate of return will increase as you expand your effort. A payoff of $10 for a $1 investment is common.

Here's How to Do It

To Stimulate Interest—F. W. Simerson, staff assistant, Factory Management Div., Sears, Roebuck & Co., Chicago, lists five techniques successful in stimulating ideas at his firm's manufacturing subsidiaries:

Man of the Month Award—Each month, an employee earns that title on the basis of his WS contributions. His name is added to a plaque in the plant. He'll also get publicity in his plant's newspaper, and his idea will be featured on a company bulletin board.

Man of the Year Award—The man who contributes the most to WS during the year wins the chance to attend Mr. Mogensen's Special Recognition Conference.

Monthly Report to Management—Top management gets a report showing the contributions of each WS participant. A record of WS effort also becomes a part of each employee's personnel record.

Adds Bruce Karnes, manager of cost research, Whirlpool Corp., St. Joseph, Mich.: "You can motivate supervisory and managerial personnel to become more active in WS—and get measurement and control at the same time—by considering their improvement activities as part of their regular performance review."

Says J. P. Rodgers Jr., manager, industrial engineering, Apparatus Div., Texas Instruments Inc.: "It's not unusual for our management people, in the course of their trips through the shop, to stop and congratulate individuals who have made improvements."

Work Simplification Programs

Letter Home—The president or general manager sends a letter home to a man when his idea is installed.

Group Meetings—Participants hear reports on WS activity, get tips from guest speakers, learn techniques.

● **Records for Recognition**—Glenn Cowan, corporate work simplification co-ordinator, B. F. Goodrich Co., believes the key to stimulating activity in WS is this: Keep accurate records of each person's participation and attainment in the program. Then keep him informed as to where he stands relative to his co-workers and how his department stacks up with others.

● **Work Through Line**—A man with line experience often makes the best local co-ordinator (a "traveling catalyst" who encourages men to look for improvement possibilities, helps them to develop their ideas, questions traditional work habits), believes Mr. Cowan. "If you must use a staff man, he should be closely tied to the line organization, like the industrial engineer." Goodrich's local co-ordinators include production managers, foremen, personnel managers, and industrial engineers.

Adds Hugh Simmons, chief industrial engineer, Union Steel Products Co., Albion, Mich.: "If you want top quality proposals, you must plan for them and ask for them through the line organization. Each man should be encouraged by his immediate superior."

● **Set Goals**—At Union Steel, each division manager sets WS goals. He asks each superintendent for X dollars of cost reduction in a given period—and often in a specific product or line. Then superintendents, with foremen, plan WS cost reduction campaigns.

Most WS authorities agree that an employee is apt to become more active in the program if its importance is emphasized to him by his immediate superior. "There's a definite correlation between management support and the success of the program in each department," says Mr. Cowan.

● **Train and Counsel**—Chesapeake & Ohio Railway Co., like most firms, began its WS program by sending key management people to Mr. Mogensen's conference at Lake Placid. Those men trained others and the activity filtered down, systematically, to the lowest jobs in the organization. Here's how E. E. Slack, who heads C&O's program, describes it: "Start at the top management level and work down till you reach the floor sweeper. By lecture, discussion, examples, motion pictures, other techniques, awaken in each man an awareness of his stake in the company. Show him how to save his firm money, and save his own job, by improving operations. Make him feel important. Introduce him to the basic tools of WS—the flow chart, the flow diagram, the procedure chart, the man and machine chart, the cost chart—but impress upon him that the most important factor is the human one. Issue flyers and booklets regularly to promote interest. While training a man, give him on-the-job counseling. It pays off. In one year, our locomotive terminal at Russell, Ky., became the cleanest on the system, petty labor grievances (which had been a headache to local management) practically disappeared; work methods were improved. For example, so many steps were eliminated in a method for drying sand that seven men were taken off the job and placed elsewhere."

● **Use Project Teams**—Many firms place WS participants on teams charged with improving specific operations. To keep the teams active, Sears: 1. Sponsors team contests. (A plant will devise a rating sheet based on factors like the number of proposals submitted, number installed, time spent on project, first year net savings, attendance at team meetings, safety, quality. The team that earns the best rating will be taken to a special event, given a dinner, or receive special merchandise awards with plaques attached.) 2. Sets goals. (A team is given a dollar goal as the amount of savings they are to shoot for in a given period. On the average, it's about $5000 per man per year.)

● **Use Movies**—One of the most widely accepted methods of improving work simplification programs is the use of motion pictures. G. Dan Devine, director of training, Semiconductor-Components Div., Texas Instruments Inc., lists these ways to use movies: 1. **Training**—Films demonstrate practical applications of tools and techniques and illustrate how to go about improving an operation. Movies give you the advantage of telling the same story the same way every time. 2. **Recognition and stimulation**—A film is made for each WS group while in training, then shown at the graduation banquet. Employees involved may take the films home to show their families and friends. 3. **Idea spreading**—Before and after movies of an operation that has been improved are shown to personnel in other departments. 4. **Analysis** — WS participants study the films of an operation to determine ways to improve it. 5. **Reporting**—Progress and accomplishments of WS are shown to management via film. 6. **Company prestige**—Maintains a loan library for other companies.

Movies are inexpensive; you can make them yourself. Texas Instruments shoots its movies on 16mm Kodachrome, does its own editing, adds musical background and narration with its own equipment. Cost: $12.10 per 100 ft. Union Steel reports that its award winning, 15 minute film cost only $375, even counting the time of the production men being filmed. Mr. Simerson reports that taking black and white movies on Tri-X film to illustrate before-and-after operations costs about $134 per 400 ft reel.

● **Payoff**—Asserts Mr. Simerson: "If a work simplification program does not yield 85 per cent acceptance of proposals, there's something wrong with the program."

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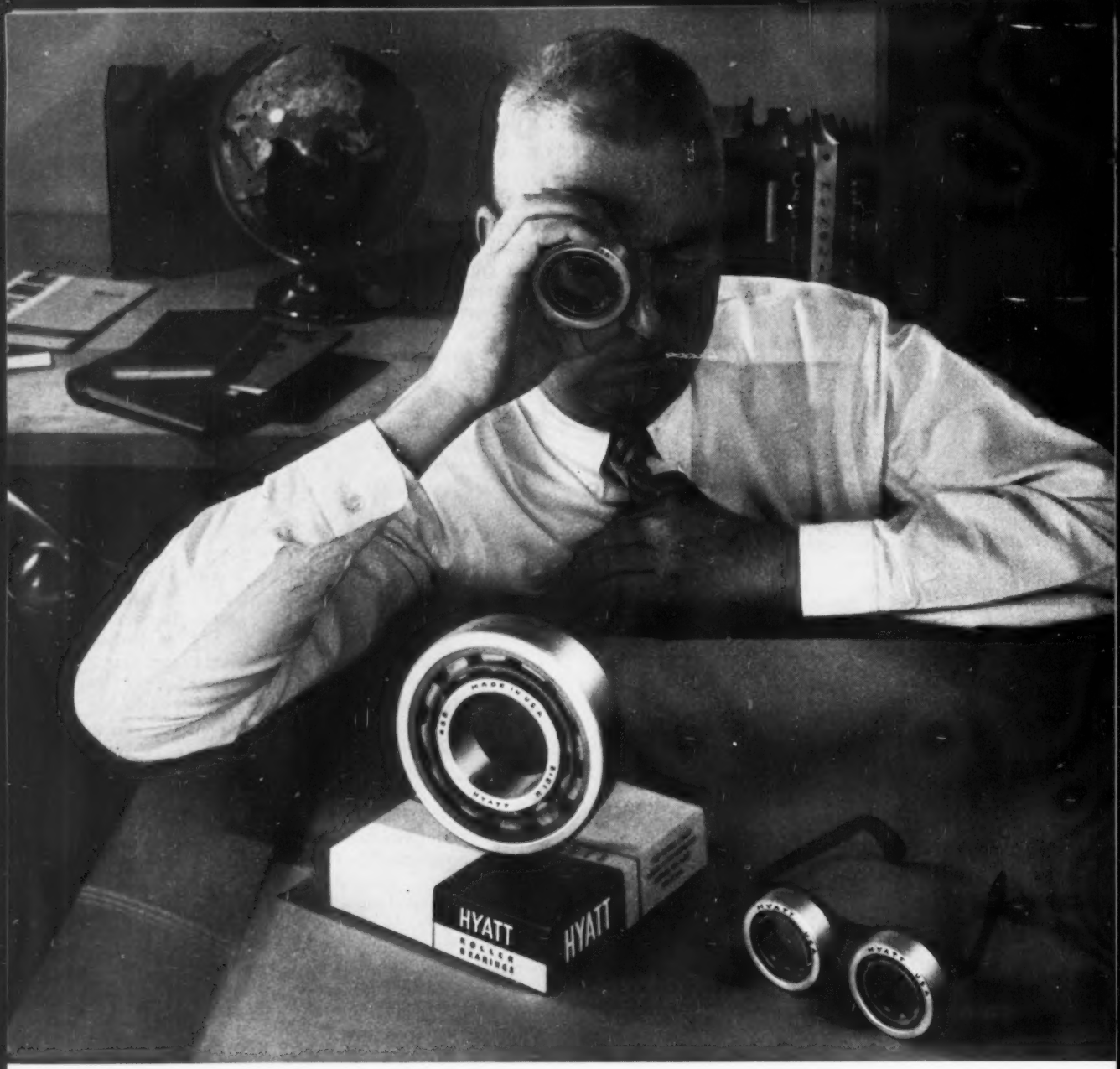

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RAMBLER

Model Production Through November

	UNITS
Rambler*	80,961
Falcon	60,155
Corvair	56,969
Lark	41,995
Valiant	16,762

*Excludes Ambassadors. Projected from *Ward's Automotive Reports*.

CORVAIR

FALCON

LARK

VALIANT

Compact Car Race Off to Fast Start

BY THE END of December, U. S. carbuilders will have turned out almost 350,000 1960 model compact cars. Fourth quarter compact sales are expected to total 291,000. Assembly plants affected by steel shortages haven't begun to catch up with orders and dealers will be going into the new year with less than 60,000 economy cars in stock.

Barring more steel upsets, there's little doubt now that at least 1.6 million American built small cars will be sold in 1960. Sales could reach 2 million units depending on how well Ford's Comet and the General Motors' B-O-P small cars are received and how quickly demand picks up following a final settlement in steel. Result: Detroit is making sure it has enough capacity to build the compacts.

• **Sales Strong**—Despite the present scarcity, sales of compact cars have risen steadily. The compacts took 16.4 per cent of October sales; climbed to 20.1 per cent in the first half of November. Now it looks like they'll hold between 20 and 25 per cent through the first quarter of next year. Introduction of Ford's Comet may boost compact sales in the spring, but it apparently will be a lone entry. GM's second small car isn't expected until 1961 models are introduced next fall.

Ramblers still fare best among the five makes. They account for about 34 per cent of compact sales. AMC reports that the 100 in. wheelbase Americans comprise a third of its production. S-P's Larks are collecting 17 per cent of compact sales and dealer deliveries have been running 46 per cent ahead of a year ago. Almost 10 per cent of Lark's production is scheduled for its convertible model, only one in the domestic compact car field.

Big Three economy cars haven't yet had a chance to pin down any predictable market shares. October registrations show 23,759 Corvairs, 18,000 Falcons, and 1300 Valiants.

There's been talk around Detroit that Falcon's price will give it a sales edge, but this seems more mythical than real. Falcon's wholesale price to dealers is only $47 less than a comparable Corvair; $64 less than a Valiant. There's another $20 difference spread among accessory prices.

By the time dealers finish dickering around, the average customer will believe he's getting a bargain no matter which car he buys.

• **Imports Shifting** — There's no strong indication that imports have been curtailed by the newer U. S. economy cars; although *Ward's Automotive Reports* points out that some softening appears in the ranks of Big Three import models. The daily selling rate of the Big Three's foreign built vehicles declined 13.3

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Ford's Getting Bigger

Ford Motor Co.'s floor space for manufacturing, assembly, parts, engineering, and sales has been increased 33.8 per cent since 1955. Biggest gains (147.4 per cent) have been in warehouses, sales, and general offices. Other increases: Engineering and research facilities, 129.8 per cent; assembly and manufacturing plants, 25 per cent.

	1959		1955	
	Plants	Sq ft (Thousands)	Plants	Sq ft (Thousands)
Manufacturing	38	36,345	34	28,958
Assembly	17	23,008	21	18,373
Part depots	28	5,410	28	4,944
Engineering & Research	20	4,167	10	1,813
Warehouses, sales, offices	..	7,463	..	3,017
Totals	103	76,393	93	57,105

per cent in September and another 9.1 per cent in October. Renault sales, on the other hand, slipped 9.9 per cent in September and only 3.5 per cent in October.

The industry has predicted 500,000 to 600,000 import sales next year compared with 620,000 for calendar 1959. At the end of November, import registrations totaled 552,000. Sales of U. S. compacts added up to 553,360.

In an automotive version of carrying coal to Newcastle, domestic Big Three builders plan to use compact cars to boost export sales. Forecasts call for them to ship 81,000 of their 1960 models overseas compared with 60,880 in 1959. Regular size Fords, Chevrolets, and Plymouths will be cut back 24 per cent from this year's figures. The increase will come from 35,200 Corvairs, Valiants, and Falcons that will be tagged for the export trade. There's also circuit talk that AMC is investigating overseas manufacturing facilities with an eye to setting up a European assembly line for Ramblers.

• **Bugs Abound**—Even though the compacts are a success, the industry has not found them troublefree. Valiant and Falcon appear to have excellent quality potential, but both are plagued by the usual new model bugs. Corvairs are being criticized for the quality of interior finishing and Detroit hears talk that rejects are high on engine components. The rear versus front engine verbal battle has quieted. One over suspension systems seems to be in the making. Corvair's swing axle is adequately designed, but competitors are making reference to recent performance trials where the GM compacts suffered severe tire wear because of toe-in trouble. That isn't necessarily the fault of the suspension system, but it's our opinion that Corvair does not ride as smoothly as its two competitors on black top and gravel roads. On the other hand, no one's looking for "big car" ride in an economy car package.

Talk about Corvair engines, however, does have some foundation, say several suppliers and company engineers. They claim that unfamiliarity with casting techniques being used at Chevy's Massena, N. Y., foundry is resulting in high reject rates on aluminum engine parts. One source says head rejects have been running as high as 34 per cent. Most of the troubles can be laid to new model bugs. The division reportedly is changing its camshaft to provide better performance.

Despite persistent rumors, Ford still retains its 3.10:1 axle ratio which is aimed at economy rather than performance. The company does offer a 3.56:1 axle which performs much more satisfactorily in passing ranges and on hills. Many Falcons scheduled for hilly areas are being equipped with this no cost option. Valiant carries a 3.55:1 axle which gives good performance, but it's considering a 3.23:1 economy ratio for cars equipped with automatic transmissions. Look for a rash of valve train and carburetor kits to appear as the industry tries to prove that economy cars can be hot handlers too.

• **Metalmen Ponder** — The metalworking industry already has figured out that compacts mean less steel per car than in previous years. One mill estimates that the average amount of steel shipped per car will be 1.75 tons in 1960 compared with 1.82 tons in 1959. That includes scrap. It will be the first time in many years that car tonnages have declined instead of risen. If the industry builds 6.7 million cars next year, it will use 11.5 million tons of steel.

U. S. Auto Output

Passenger Only	1959	1958
January	545,757	489,515
February	478,484	392,132
March	576,085	357,048
April	578,825	316,594
May	546,817	349,613
June	557,994	337,446
July	555,418	321,017
August	239,152	180,447
September	258,157	130,460
October	507,530	261,701
10 Mo. Totals	4,844,219	3,135,973
November	252,600†	514,152
December	.....	593,920
Total	.....	4,244,045

Week Ended	1959	1958
Oct. 31	101,616	97,804
Nov. 7	63,451	125,279
Nov. 14	64,230	117,688
Nov. 21	68,476	138,727
Nov. 28	43,958†	123,008
Dec. 5	60,000*	147,361

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

CASE HISTORIES
BRYANT
New Departure super precision angular contact bearings add new sales appeal to high frequency grinding spindles.

Photo: Courtesy Bryant Chucking Grinder Co., Springfield, Vermont

Ball Bearings Cut Costs $180.00 On 100,000 RPM Grinding Spindle!

CUSTOMER PROBLEM:

Machine tool maker experienced excessive assembly time with integral shaft type ball bearings in the production of 100,000-rpm grinding spindles for precision grinders. The ball bearing, with ground shaft serving as inner race, plus special balls, separator and outer race, required careful parts matching and assembly. Also, shaft and bearing replacement costs, if required, were high.

SOLUTION:

N/D Sales Engineer, in cooperation with the manufacturer, recommended using New Departure production ball bearings fitted directly to the shaft. These super precision, ultra high speed ball bearings eliminated the need for ball track grinding and delicate eccentricity matching at assembly. Using N/D ball bearings and engineering assistance, the manufacturer reduced parts and assembly costs $180 per unit. What's more, in the rare case of spindle damage, shaft assembly replacement costs have now been reduced $175 (over earlier models) . . . shaft assembly or bearings can be replaced separately, thanks to New Departure.

If you are working on new machine tool designs, or have questionable production costs, why not contact New Departure? There's probably a precision N/D production ball bearing that can save you time or money! Call or write New Departure Division, General Motors Corp., Bristol, Conn.

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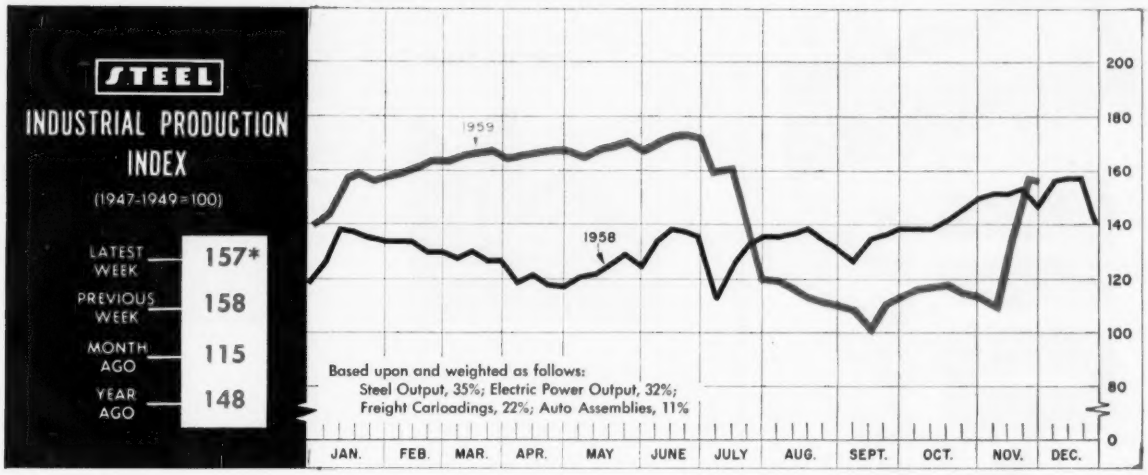


*Week ended Nov. 28.

Machine Tool Orders at Year's Peak

THE OCTOBER report of the National Machine Tool Builders' Association contained several eyebrow raising statistics:

1. Net new orders for both cutting and forming tools rose to the highest level of the year—$67,150,000. (See graph, Page 111.) 2. The rise was caused entirely by the smaller segment of the industry — forming tools—as domestic orders hit a three year high and foreign business topped anything in the record books. 3. Orders for cutting tools, the backbone of the industry, dipped.

• **Story Behind the Story** — But none of the October results can be considered as trend setters. There were too many unusual aspects to that month's business. Most interesting, perhaps, is the fact that practically all the increase in domestic forming tool orders (from September's $10.2 million to $15.7 million) can be accounted for by one purchase by an automotive firm (reliably reported to STEEL as Fisher Body Div. of General Motors Corp.). The order, which one industry source says went mostly to E. W. Bliss Co., Canton, Ohio, included 41 presses costing about $5 million.

It is understood that the tools will form three complete stamping lines for Fisher Body. STEEL also learned that the lines will be used for small car bodies, probably the new B-O-P entry in the 1961 model race.

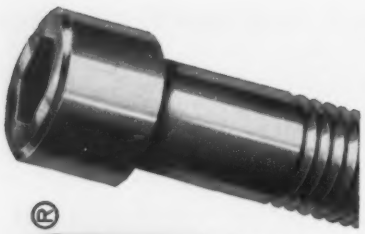
Almost as interesting is the record $7.8 million in foreign business for forming tools. Industry sources tell STEEL that the bulk of it went to Danly Machine Specialties Inc., Chicago, which will build 11 presses of about 800 tons capacity for German and Japanese fabricators. The largest previous monthly total for foreign orders of machine tools of this type was $5,050,000 last July. (NMTBA has released figures for this category only since 1956.)

• **Work for 1960**—The net result

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1,000 net tons)[2]	2,619[1]	2,233	1,985
Electric Power Distributed (million kw-hr)	13,400[1]	13,812	12,274
Bituminous Coal Output (1,000 tons)	9,430[1]	8,935	9,179
Crude Oil Production (daily avg—1,000 bbl)	7,000[1]	6,935	6,983
Construction Volume (*ENR*—millions)	$389.8	$372.1	$273.0
Auto, Truck Output, U. S., Canada (*Ward's*)	56,104[1]	84,660	153,187
TRADE			
Freight Carloadings (1,000 Cars)	565[1]	629	539
Business Failures (Dun & Bradstreet)	287	285	260
Currency in Circulation (millions)[3]	$32,269	$32,235	$31,825
Dept. Store Sales (changes from year ago)[3]	+8%	+6%	+2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,053	$28,836	$23,231
Federal Gross Debt (billions)	$290.5	$290.5	$283.5
Bond Volume, NYSE (millions)	$26.0	$35.3	$27.7
Stocks Sales, NYSE (thousands of shares)	13,669	17,136	16,941
Loans and Investments (billions)[4]	$104.3	$104.3	$93.8
U. S. Govt. Obligations Held (billions)[4]	$27.5	$27.7	$31.3
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	231.7	231.9	217.5
All Commodities[7]	118.9[1]	118.9	119.1
Commodities Other than Farm & Foods[7]	128.6[1]	128.6	126.9

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1959, 2,831,486; 1958, 2,699,173. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.



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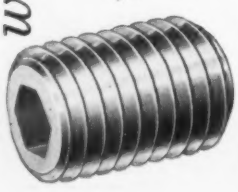
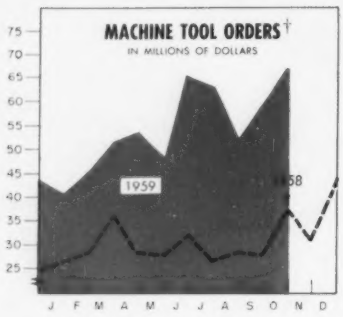


THE BUSINESS TREND



	New Orders 1959	New Orders 1958	Shipments 1959	Shipments 1958
Jan.	41,050	26,850	31,300	57,800
Feb.	45,400	28,300	36,050	48,050
Mar.	51,550	36,150	45,750	54,150
Apr.	53,200	28,300	45,000	50,900
May	48,700	28,050	41,000	50,100
June	65,400	32,100	50,050	45,500
July	63,400	26,550	40,600	29,700
Aug.	52,200	28,300	40,300	29,800
Sept.	58,850	28,100	46,150	34,900
Oct.	67,150*	37,000	52,250*	41,400
Nov.	.....	30,700	.....	33,650
Dec.	.....	43,900	.....	43,950
Totals	.....	374,300	.....	519,900

†Metal cutting and metal forming.
*Preliminary.
National Machine Tool Builders' Assn.
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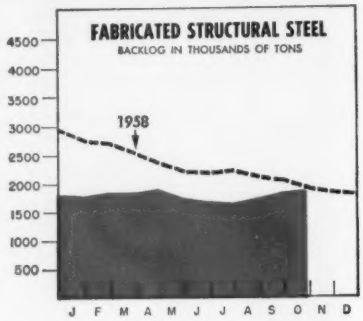


	Shipments 1959	Shipments 1958	Backlogs 1959	Backlogs 1958
Jan.	224.3	316.7	1,794	2,778
Feb.	216.1	282.6	1,864	2,727
Mar.	260.5	336.6	1,873	2,542
Apr.	290.6	323.6	1,922	2,387
May	294.1	328.2	1,768	2,211
June	365.4	329.2	1,717	2,191
July	238.6	290.8	1,679	2,220
Aug.	220.4	298.0	1,772	2,119
Sept.	182.6	313.7	1,871	2,047
Oct.	195.3	307.1	1,891	1,913
Nov.	....	271.1	....	1,839
Dec.	....	266.6	....	1,809
Total	....	3,664.2		

American Institute of Steel Construction.

of the October order activity is a further extension of the industry's backlog to 5.1 months, the highest level since March, 1957. It means a good start for 1960. Even though the industry has the capacity to build at twice the current rate, it should be noted that any one order the size of the Fisher Body purchase is enough to keep a producer busy for at least the next eight to ten months.

Builders apparently are not worried about the moderate decline in cutting tool orders in October. The trend line for this segment of the industry so far this year follows a saw-tooth pattern. The general direction is up. Despite the upturn in orders following the recession, total cutting tools shipments for 1959 are going to end up close to last year's $411 million.

Capital Spending Brisk

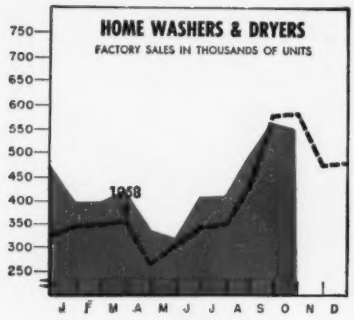
Business spending for new plant and equipment in 1960 will run "at least 10 to 12 per cent above the strike-depressed 1959 total of roughly $32 billion," estimates Prentice-Hall Inc., Englewood Cliffs, N. J. The biggest gains in next year's outlay will be in: Iron and steel, up 76 per cent; paper and pulp, up 35 per cent; rubber, up 31 per cent; autos, trucks and parts, up 30 per cent; electrical and nonelectrical machinery, up 22 per cent.

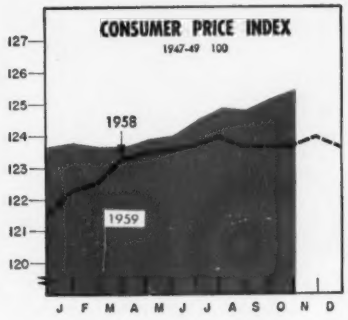
Other trends expected by P-H in 1960 capital spending:

- Gains in nonmanufacturing areas will be less spectacular. Railroad and other transportation and communication spending will rise 10 to 14 per cent, while electric and gas utilities look for a 3 per cent gain.
- Capital spending by U. S. manufacturers abroad will level out next year at the high 1959 rate. Government and private surveys suggest that outlays for foreign capital goods will come close to 10 per cent of domestic spending. Rather than build new foreign plants, more U. S. firms are buying into established European and other foreign companies.
- New equipment, rather than plant, will account for proportionately higher spending. Producers feel that capacity is adequate and elect to concentrate on the latest technological developments for improving productivity and cutting unit labor costs.

Philadelphians Sit Tight

Manufacturers in the Philadelphia area are not planning such increases,





	Washers		Dryers	
	1959	1958	1959	1958
Jan.	288,491	244,840	118,220	100,793
Feb.	297,826	268,143	106,274	79,683
Mar.	329,668	287,884	98,434	71,523
Apr.	274,372	224,896	67,752	38,475
May	277,934	262,999	45,903	41,898
June	341,894	288,831	70,838	54,173
July	318,063	277,287	95,248	75,513
Aug.	359,849	326,785	133,197	109,833
Sept.	394,112	423,073	174,560	158,733
Oct.	374,135	404,056	179,669	180,405
Nov.	.....	333,035	.....	142,499
Dec.	.....	330,520	.....	148,670
Totals		3,672,349		1,202,198

American Home Laundry Mfrs. Assn.

	1959	1958	1957
Jan.	123.8	122.3	118.2
Feb.	123.7	122.6	118.7
Mar.	123.7	123.3	118.9
Apr.	123.9	123.5	119.3
May	124.0	123.6	119.6
June	124.5	123.7	120.2
July	124.9	123.9	120.8
Aug.	124.8	123.7	121.0
Sept.	125.2	123.7	121.1
Oct.	125.5	123.7	121.1
Nov.	....	123.9	121.6
Dec.	....	123.7	121.6

U. S. Bureau of Labor Statistics.

says the Federal Reserve Bank of Philadelphia. In its latest survey of capital spending expectations, the bank found that spending this year will total about $357 million and will rise only slightly to $360 million next year. Most of the respondents also feel that 1961 spending will hold to that level. But the bank points out that most of those who did not hold that opinion tend to be bullish rather than bearish.

The survey also indicates greater efficiency in 1960. While manufacturers expect a slight decline in employment through the first half, they foresee a slight rise in production compared with the last half of 1959.

Index Ignores Holiday

For the first time in many years, STEEL's industrial production index failed to decline appreciably during the Thanksgiving week. Reason: The steel industry's big rush to get out every ounce of metal it can before the Taft-Hartley injunction ends. Increased steel production held the index to a preliminary 157 (1947-49=100) for the week ended Nov. 28, only a point under the revised reading for the preceding week.

The steel industry continued its spectacular recovery by operating at 89.7 per cent of its capacity during the week ended Nov. 29. Last week, producers scheduled operations at 92.5 per cent of capacity, good for 2,619,000 tons of steel for ingots and castings. It is the highest tonnage produced since the third week in June. It is also close enough to the record set in April (2,657,000 tons) to speculate about a new record sometime this month.

The upsurge in steel output is responsible for less than usual holiday declines in some of the other components of the index. Railroad freight carloadings and electricity output are increasing rapidly as mills strive for peak production. Miscellaneous freight, coal, and coke shipments are counterbalancing some of the seasonal declines in other types of freight. Edison Electric Institute reports that output is about 10 per cent greater than a year ago.

But auto production continues to feel the pinch for steel. Output in November fell to 252,600 units compared with October's 507,530 mark. And December is getting off to an even slower start. However, *Ward's Automotive Reports* predicts an all-time record production of 2,240,800 units in the first quarter of 1960 if steel production is maintained.

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Now . . . at a low, low cost . . . you can get brilliantly bright and sparkling colors from an improved Luster-On Chromate dip process for your zinc-plated small parts.

And . . . even more important . . . these are not just dull identification colors. They are glamorous and sales-building golds, yellows, blues, reds, greens, violets, brass and copper hues.

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Other Luster-On Finishes

- Clear or iridescent on zinc or cadmium
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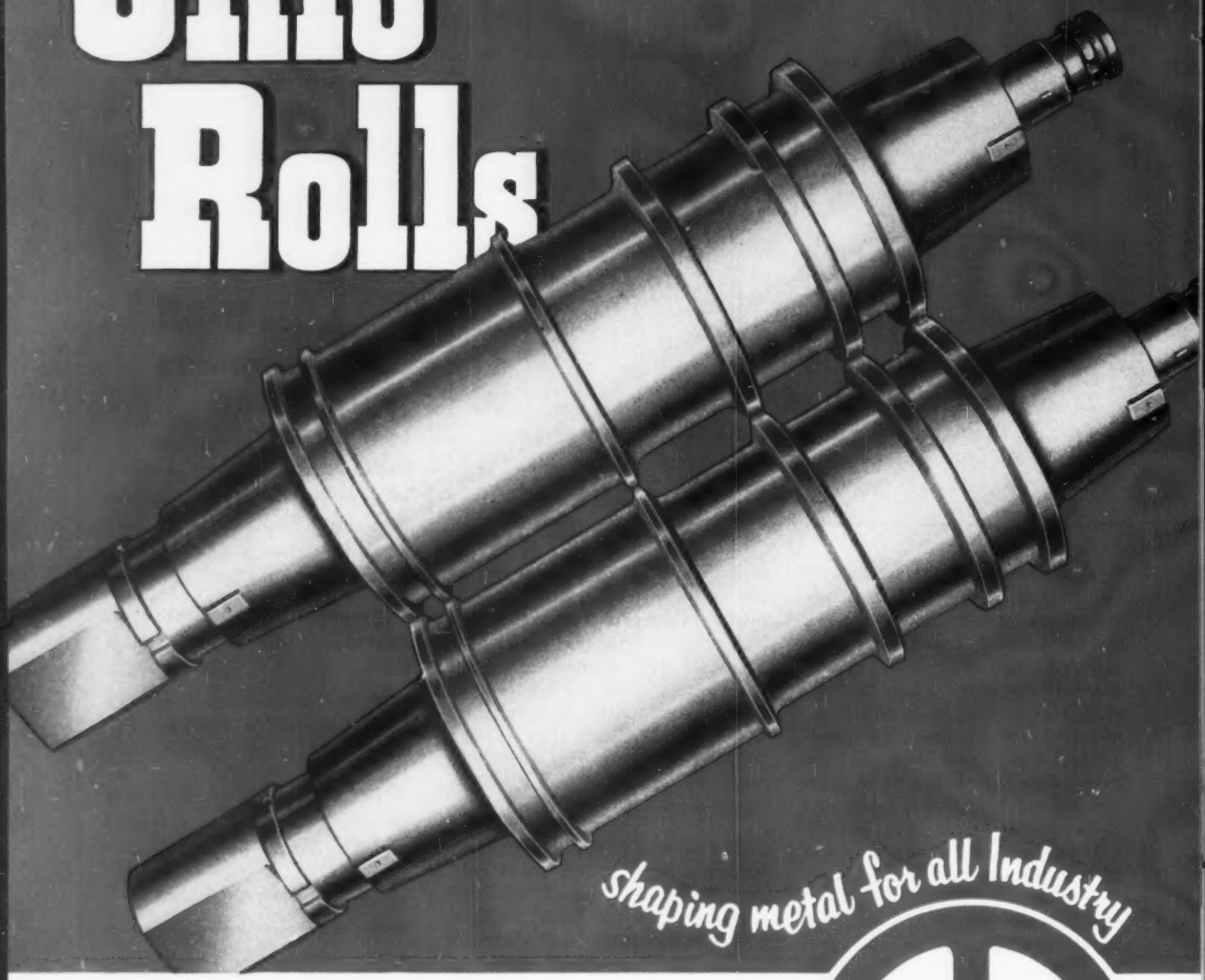
All easy to produce, consistent to control, giving long corrosion protection.

The Chemical Corporation

72 Waltham Ave. • Springfield 9, Mass.

West Coast: Crown Chem. & Engr., Los Angeles & San Francisco
Canadian Licensee: Alloycraft Ltd., Montreal

Ohio Rolls



shaping metal for all Industry

OHIO IRON AND STEEL ROLLS

Carbon Steel Rolls	Flintuff Rolls	Denso Iron Rolls
Ohioloy Rolls	Double-Pour Rolls	Nickel Grain Rolls
Ohioloy "K" Rolls	Chilled Iron Rolls	Special Iron Rolls
Nioloy Rolls	Forged Steel Rolls	

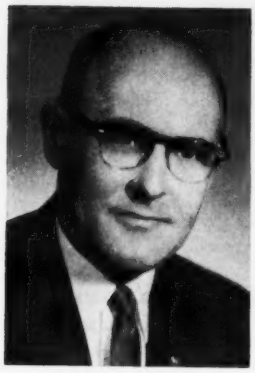
The Ohio Steel Foundry Co.

LIMA, OHIO

LIMA... Virtually at the center of the steel industry

PLANTS AT LIMA AND SPRINGFIELD, OHIO

OR30



LOUIS J. JACOBS
Obermayer v. p.

ROBERT A. BARR
Babcock & Wilcox v. p.

BYRON VAN STEENBURGH
Bunting sales adm. mgr.

DOUGLAS K. RIDLEY
new post at Honeywell

Louis J. Jacobs, former research director, was appointed vice president-manufacturing and research, **S. Obermayer Co.,** Chicago. He will direct these operations for both the Obermayer Div. (foundry materials) and the Ramtite Div. (refractories).

James L. Dawson was named vice president, **Standard Steel Specialty Co.,** Beaver Falls, Pa., and general manager of its **Superior Drawn Steel Co. Div.,** Monaca, Pa. He succeeds **John A. Guyton,** retiring. **Roger A. Brown** was named sales manager of the division.

Richard W. Pearce, works manager, and **William L. Sammons,** general sales manager, were elected vice presidents of **B-I-F Industries Inc.,** Providence, R. I.

Paul W. Leming was made president, **Van Norman Machine Co.,** Springfield, Mass. He succeeds **Charles R. Crowder.**

M. C. Parker, sales manager, and **Allan L. Goellner,** chief engineer, were made vice presidents of **Reliance Gauge Column Co.,** Cleveland.

Harry W. Vinson was promoted to sales manager, **Empire Steel Corp.,** Denver. He has been with the company since 1955.

William C. Conley was made production control manager at **Ford Motor Co.'s** Indianapolis plant. He succeeds **J. V. Ketchman,** transferred to the company's manufacturing staff in Dearborn, Mich.

Robert A. Barr was elected a vice president, **Babcock & Wilcox Co.,** New York, in charge of the Refractories Div. He replaces **James E. Brinckerhoff,** retiring Dec. 31. Mr. Barr, who continues headquarters in the New York office, was appointed general manager of the division earlier this year.

Byron van Steenburgh assumes the new post of sales administration manager, **Bunting Brass & Bronze Co.,** Toledo, Ohio. He was head of the Special Sales Div., which has responsibility for design and engineering of original equipment parts. He is succeeded by **William J. McTighe,** former New England district manager for the company. **Parker E. Holt,** Chicago office, transfers to Boston to succeed Mr. McTighe.

Maynard C. Isheim was named manager, Process Equipment Div., Los Angeles, **Standard Steel Corp.** He joined the corporation last May as assistant chief engineer of the division. For 12 years previously, he had been with C. O. Bartlett & Snow Co., Cleveland.

Alan G. Grey and **Charles F. Cooper** were appointed assistant general sales managers for **Kaiser Steel Corp.,** Oakland, Calif. Mr. Grey will direct administrative and staff sales functions. Mr. Cooper will head sales solicitation activities.

J. H. Howard was appointed director of marketing; **R. A. Thomas** director of contracts of the Aircraft, Missile, and Marine Divisions of **Sargent Engineering Corp.,** Huntington Park, Calif.

Douglas K. Ridley was appointed by **Minneapolis-Honeywell Regulator Co.** to a new post as contract sales manager for automatic control equipment produced by its Philadelphia based Brown Instruments Div. and other Industrial Products Group units. He served as Honeywell's regional sales manager in Dallas and Chicago prior to his new assignment.

E. L. Phillips as regional manager-West Coast operations fills a newly created post for **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div. He is responsible for the Los Angeles district sales office, mill, and service center. **John E. Cottier Jr.** assumes responsibility for mill sales, and **John H. Sutton** was made assistant district sales manager, Los Angeles. Mr. Phillips was manager of the division's Los Angeles plant.

William Butler III was made administrative assistant to the president of **Wheelabrator Corp.,** Mishawaka, Ind. He was with Lukens Steel Co.

Nicholas F. Pedersen joined **Aero Hydraulics Div.,** Vickers Inc., Detroit, as executive engineer-major programs. For three years prior to joining Vickers, a division of Sperry Rand Corp., Mr. Pedersen served as design engineer-hydraulics at Hamilton Standard Div., United Aircraft Corp.

John J. McGlone, vice president of **Wellman Engineering Co.,** Cleveland, was named Chicago district manager, where he will represent the full engineering and product line of the McDowell-Wellman in-

R. H. BINKERD
NRC Equipment gen. sales mgr.

JOSEPH L. BURGESS JR.
Arrow Tool purchasing

W. R. DAVIS
Cameron Iron Wks. v. p.

R. JAMES SWARTOUT
Belle City Malleable pres.

terests. He was general manager of Wellman's Williams Bucket Div.

R. H. Binkerd was appointed general sales manager, **NRC Equipment Corp.**, Newton, Mass., subsidiary of National Research Corp. He was with Alco Products Inc.

Joseph L. Burgess Jr. was promoted to purchasing and production control manager, **Arrow Tool Co. Inc.**, Wethersfield, Conn. He was office manager.

Charles E. Hummel was made director of purchases, **Maddock & Co. Inc.**, Bala-Cynwyd, Pa.

James M. Arnold was named president; **John K. Boeing** chairman of **Recordak Corp.**, subsidiary of Eastman Kodak Co., New York.

John M. Whalen was appointed purchasing agent, **Duluth, Missabe & Iron Range Railway Co.**, Duluth, to succeed **C. H. Wiles**, retired. **Norman H. Downs** was made assistant purchasing agent.

Frederick C. Chambers was made export manager for **Koehring Co.**, Milwaukee. He was with Allis-Chalmers Mfg. Co.'s Tractor Group as manager of Latin American sales.

Henry H. Apgar was made assistant manager-purchases, **Sylvania-Corning Nuclear Corp.**, Hicksville, N. Y.

W. J. Shaw, assistant to the president of **Woodward Iron Co.**, Birmingham, was elected vice president-manufacturing.

M. G. Newberger was made vice president-sales, **Avnet Corp.**, Los Angeles.

W. R. Davis was elected vice president and manager, Pressure Control Equipment Div., **Cameron Iron Works Inc.**, Houston. Others newly elected: **A. D. Blackledge**, vice president-assistant manager; **J. H. Grubb**, vice president-manager, International Div.; **J. W. Brougher**, vice president - manager, Special Products Div.; **C. G. Hayward**, vice president-controller; **J. B. Ogden**, vice president-manager, Industrial Relations.

Philip J. Monaghan was appointed vice president, **General Motors Corp.**, Detroit, in charge of the Process Development Staff. **Calvin J. Werner** succeeds Mr. Monaghan as general manager, GMC Truck & Coach Div., Pontiac, Mich., and is in turn succeeded by **Norman L. Gebhart** as general manager, Moraine Products Div., Dayton, Ohio. Mr. Monaghan succeeds **Robert M. Critchfield**, retired.

Robert R. Shellman was made president, **Eastern Heat Treating & Brazing Corp.**, and its sister firm, Eastern Metals Inc., Glen Cove, N. Y. He appointed **Dominick A. Monaco** executive vice president; **Donald W. MacVicar** vice president-sales; **Joseph R. Parella** quality control manager.

K. H. Zinsmaster was promoted from general manager to vice president-general manager, **Aro Equipment of Canada Ltd.**, Toronto, Ont., subsidiary of Aro Equipment Corp., Bryan, Ohio.

Ernest H. Neill was appointed sales manager, **Industrial Stainless Steels Inc.**, Cambridge, Mass., marketing subsidiary of Eastern Stainless Steel Corp., Baltimore.

R. James Swartout was elected president of **Belle City Malleable Iron Co.**, Racine, Wis., and its subsidiary, **Racine Steel Castings Co. Charles S. Anderson** was re-elected chairman and named chief executive officer. Mr. Swartout was vice president and assistant secretary. **Hubert C. Cunningham** was named assistant secretary; **Robert D. Leutner**, assistant treasurer.

J. Robert Pauline was promoted to vice president-manufacturing, **Scaife Co.**, Pittsburgh, subsidiary of Wilson Bros. In February of this year, he joined Scaife as vice president-Kellogg-American Div. He had been vice president-operations, Kellogg Div., American Brake Shoe Co.

Robert M. Giroux was made midwestern regional manager, Owosso Div., **Midland-Ross Corp.**, Chicago.

Thomas E. Thorpe was made manager-technical sales, Rolling Oils Div., **L. R. Kerns Co.**, Chicago.

John B. Van Dien Jr. was named director, Non-Destructive Testing Div., Belleville, N. J., **General Magnaplate Corp.**

E. W. Sloan Jr. was elected president, **Oglebay Norton Co.**, Cleveland, to succeed **Harrie S. Taylor**, elected vice chairman. Mr. Sloan was executive vice president.

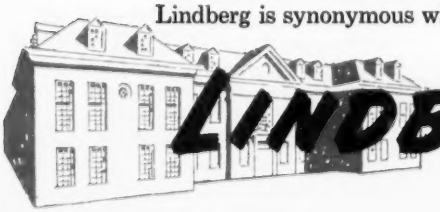
Donald Calkins was appointed manager-contract services, **Baird Machine Co.**, Stratford, Conn.

H. R. Mantle was named assistant to the president, **Dravo Corp.**, Pittsburgh.

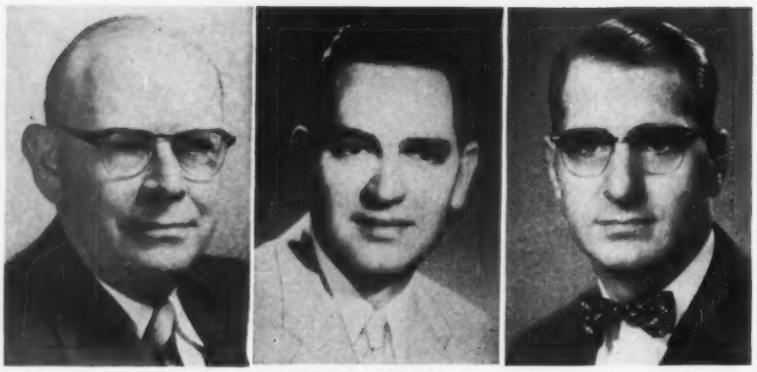
Eugene B. Hotchkiss was named ex-

How to find a better heat-treating method

Here's a sound way to do it. Take your problems to the people who have consistently, over the years, provided the metal treating industry with new and better ideas, more efficient, more practical equipment. This will bring you to Lindberg, creators of the famous Cyclone type atmosphere furnaces, the long-life "dimple" vertical radiant tube, the revolutionary new CORRTHERM electric heating element and so many other innovations in better heat treating methods. Lindberg is synonymous with heat treating furnaces. We build them for carbonitriding, carburizing, hardening, tempering, normalizing, bright stainless annealing, brazing, carbon correction, nitriding, or any other metal treating requirement. Give your production processes the advantages of Lindberg's forward look in "heat for industry" techniques. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write Heat Treating Furnace Division, Lindberg Engineering Company, 2441 W. Hubbard St., Chicago 12, Illinois.



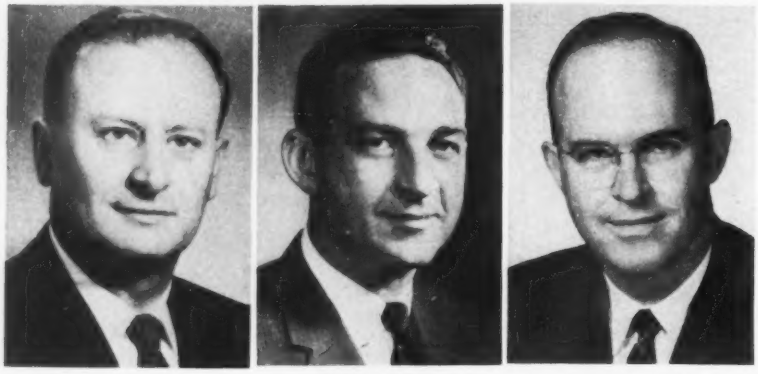
LINDBERG heat for industry



JOHN M. LEIGHTON
Armco Div. purchasing post

WAYNE L. DOWDEY
Eimco gen. sales mgr.

JOHN D. AMOROSO
Tube Manifold plant mgr.



WALTER J. KRUEL
Hallamore exec. v. p.

MARVIN LANE
gen. mgr. of Graver

JOSEPH F. KNIGHT
Kaiser Refractories operations

ecutive vice president of **Vitro Minerals Corp.**, New York.

Walter J. Kruel was named executive vice president, **Hallamore Electronics Div.**, Siegler Corp., Anaheim, Calif.

Harry L. Williamson Jr. was named vice president-general manager, **Master Power Corp.**, Bedford, Ohio. He succeeds **Leonard J. Roll**, made secretary and assistant treasurer.

Super Tool Co., Detroit, appointed **L. A. McDonald** vice president-general manager, **M. J. Steffes** vice president-engineering, **E. J. Novack** general sales manager.

John A. Kovas was named general sales manager, Appliance & Automotive Controls Div., **Controls Co. of America**, Schiller Park, Ill.

Charles E. Frost was made sales manager, mill products, for the southwestern sales district of **Electric Steel Foundry Co.** in Los Angeles.

Marvin Lane, technical director of **Graver Water Conditioning Co.**, New York, division of Union Tank Car Co., was named general manager of the division. He succeeds **H. T. Sulcer**, resigned.

Joseph F. Knight was appointed manager of operations for **Kaiser Refractories & Chemicals Div.**, Kaiser Aluminum & Chemical Corp., Oakland, Calif. He is responsible for all the division's manufacturing facilities in the U. S. **Charles A. Smith**, who was appointed a vice president of the corporation following merger earlier this year with Mexico Refractories Co., will co-ordinate the division's research and product development, technical services, engineering, and raw materials. He will have headquarters in Oakland about Jan. 15.

L. B. Krumm was made Detroit district manager for **Bristol Co.**

James P. Malmstrom was appointed assistant to the president, **Koehler Aircraft Mfg. Co.**, Dayton, Ohio.

John M. Leighton was named supervising purchasing agent for **Armco Div.**, Armco Steel Corp., Middletown, Ohio. **William M. Schuck** was made assistant to director of purchases. **Wilson F. Welch** advances to purchasing agent; **A. E. Cockman Jr.** to assistant purchasing agent.

Paul O. Richter, vice president, **Eimco Corp.**, Salt Lake City, Utah, was named general manager of the Filter Div. **Wayne L. Dowdey**, former manager of Eimco's southern district, was appointed general sales manager for the corporation.

John D. Amoroso was made plant manager, **Tube Manifold Corp.**, North Tonawanda, N. Y.

Herbert W. Wehe Jr., vice president-sales, was promoted to executive vice president of **Overly Mfg. Co.**, Greensburg, Pa.

Snap-On Tools Corp., Kenosha, Wis., promoted **George W. Harrington Sr.** to north central regional manager. He is succeeded by **Theodore A. Wiesendanger** as Milwaukee branch manager.

D. Brian Wheeler was appointed director of sales engineering for **White Truck Div.**, Cleveland, White Motor Co. He replaces **William L. Peterson**, new manager in Philadelphia.

OBITUARIES...

Howard L. McGregor, chairman, **National Twist Drill & Tool Co.**, Rochester, Mich., died recently.

John D. Bradley, 49, president, **Bunker Hill Co.**, San Francisco, and newly elected president of Lead Industries Assn., was killed in an auto accident Nov. 26.

Richard B. Tucker, former executive vice president, **Pittsburgh Plate Glass Co.**, Pittsburgh, died Nov. 26.

William J. Hutchinson, 75, former treasurer, **International Nickel Co. of Canada Ltd.**, and its U. S. subsidiary, International Nickel Co. Inc., New York, died Nov. 25.

William MacG. Shiras, 87, steel industry pioneer (Carnegie Steel Co.), died recently.

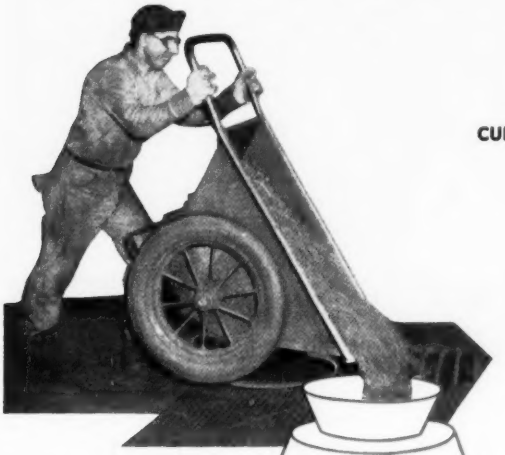
SAVE $36.00 a ton on cast iron chips

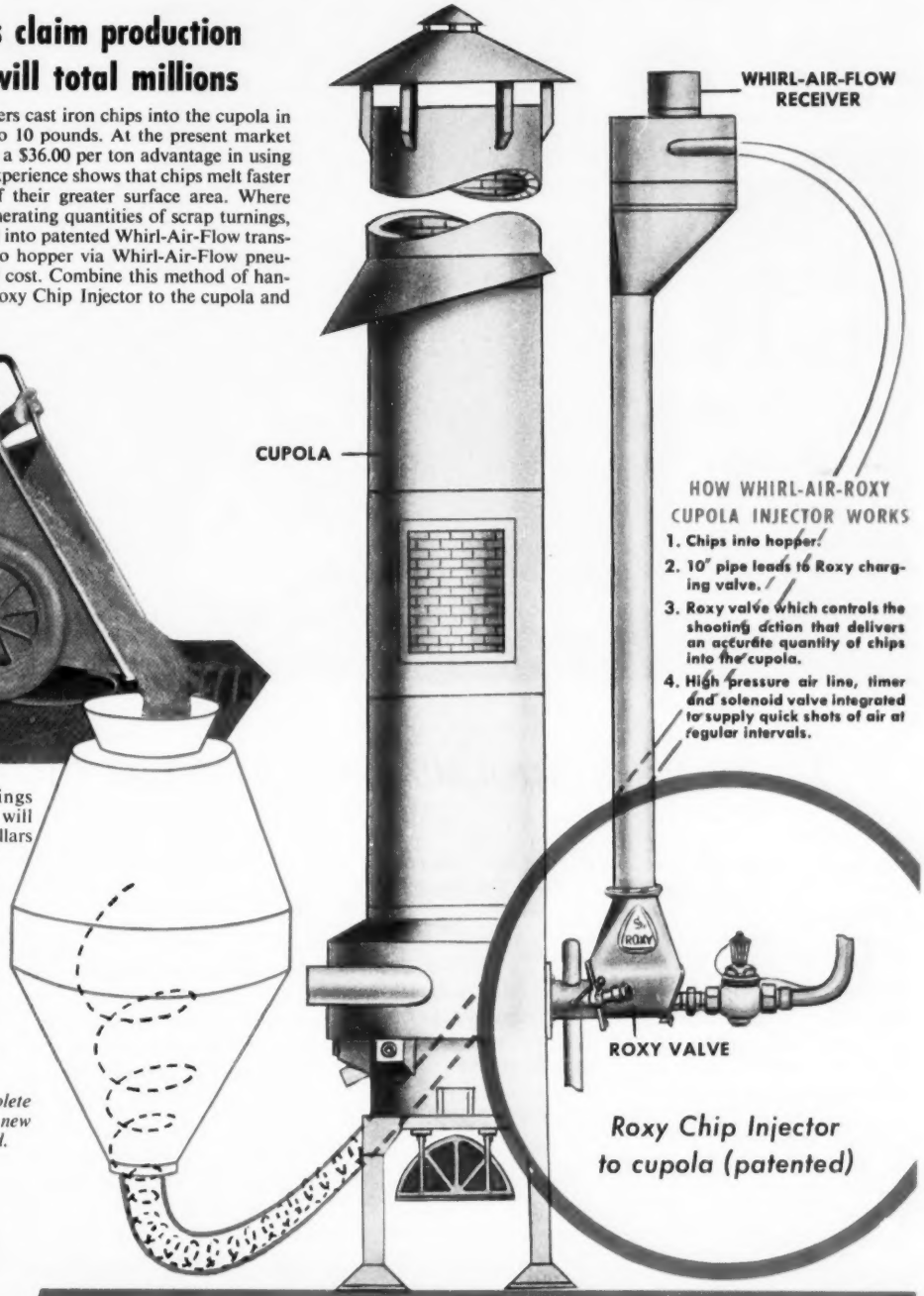
New Whirl-Air-Roxy method delivers chips from Machine Shop to Cupola *(patented)*

Foundries claim production savings will total millions

New Roxy valve delivers cast iron chips into the cupola in measured shots of 7 to 10 pounds. At the present market value of scrap there is a $36.00 per ton advantage in using chips. Also, foundry experience shows that chips melt faster than scrap because of their greater surface area. Where machine shops are generating quantities of scrap turnings, they can be discharged into patented Whirl-Air-Flow transporter and delivered to hopper via Whirl-Air-Flow pneumatic conveyor at low cost. Combine this method of handling chips with the Roxy Chip Injector to the cupola and you will achieve savings that foundrymen say will amount to a million dollars in very few years of operation. The Whirl-Air-Roxy method is easily applied to any size foundry; small, medium or large. Initial cost is low and savings will pay for installations in a period of a few months. We invite your exploratory inquiry.

Write or wire for complete information on the new Whirl-Air-Roxy method.




WHIRL-AIR-FLOW RECEIVER
CUPOLA
HOW WHIRL-AIR-ROXY CUPOLA INJECTOR WORKS
1. Chips into hopper.
2. 10" pipe leads to Roxy charging valve.
3. Roxy valve which controls the shooting action that delivers an accurate quantity of chips into the cupola.
4. High pressure air line, timer and solenoid valve integrated to supply quick shots of air at regular intervals.
ROXY
ROXY VALVE
Roxy Chip Injector to cupola (patented)

WHIRL AIR FLOW PNEUMATIC CONVEYORS

WHIRL-AIR-FLOW

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There goes another consignment of red ink

The salesman spent a week in Bermuda on his commission. The front office rejoiced. But the company lost money.

What was wrong? Factory overhead.

This company has a plant-wide burden rate. All costs are based on it. In some departments, actual overhead is *less* than the standard rate. Profits are high. In others—notably those which turned out these assemblies—actual overhead *exceeds* the standard rate. Prices don't cover it. Profits are seldom—if ever.

How different with Automatic Keysort Data Processing! With Automatic Keysort, the Plant Manager can pinpoint burden charges by *department* . . . and prices may be set to allow for profit in each operation. Because plant operating figures are reported *on time*, unrealistic overhead rates can be quickly spotted.

Automatic Keysort's easy-to-use machines and punched cards require no specialized personnel, no restrictive procedures. Designed to fit your business as it stands and as it grows, Automatic Keysort will give you all the fast, accurate information you need for modern management control of every factory operation. And at remarkably low cost.

To learn more about how Automatic Keysort Data Processing can fulfill *your* need for timely, comprehensive facts and figures, call your nearby Royal McBee Data Processing Representative, or write Royal McBee Corporation, Data Processing Division, Port Chester, New York for brochure FS-43.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

Copperweld Expansion To Hit $15.8 Million

COPPERWELD STEEL CO., Pittsburgh, is strengthening its competitive position by investing $15.8 million in new equipment. The three year expansion program will include all operating divisions.

• **Aristoloy Steel Div.**—Scheduled for the Warren, Ohio, plant are: More treatment furnaces, construction of a consumable electrode vacuum furnace, addition of four soaking pits, and other facilities. This part of the program (22 projects) will involve about $5,308,000. The division's products include structural alloy steel, stainless steel, special quality carbon steel, cold finished carbon and alloy bars, and reinforcement bars.

• **Superior Steel Div.**—About $2.4 million will be spent at the Carnegie, Pa., plant for slitting facilities and equipment to increase coil sizes. The division produces hot and cold rolled strip steels.

• **Wire & Cable Div.**—The program at the Glassport, Pa., plant will involve $3.5 million for expansion and $2.5 million for new equipment. Products include copper covered steel wire, rods, and strand; and aluminum covered steel wire and strand.

• **Other Divisions** — Details of expansion and modernization of facilities at Copperweld's two other plants have not been announced. Products made at the Ohio Seamless Tube Div. at Shelby, Ohio, include mechanical seamless tubing, aircraft mechanical seamless tubing, airframe seamless tubing, and electricweld steel tubing. Forming and fabricating operations are also done.

The Flexo Fine Wire Div. at Oswego, N. Y., produces fine wires and cables (copper covered steel, copper, and other metals).

Expands Steel Foundry

Mackintosh-Hemphill Div., E. W. Bliss Co., Pittsburgh, will add two annealing furnaces, a mold drying oven, enlarged roll casting pits, and an overhead crane to facilities at its steel foundry at Midland, Pa. The expansion also includes a new Mackintosh-Hemphill automatic contouring roll lathe recently placed in operation, as well as several alterations to material handling facilities. Total cost: More than $1 million.

Turkey to Get Steel Mill

Turkey has signed a letter of intent with three U. S. companies for construction of a steel mill at Eregli on the Black Sea. The firms involved are Westinghouse Electric Corp., Koppers Co., and Blaw-Knox Co., all of Pittsburgh. They will be awarded contracts involving about $144 million. The mill is scheduled to be in production by 1963.

Connors Adds Soaking Pits

Construction has started on a melt shop addition to the Huntington, W. Va., plant of Connors Steel Div., H. K. Porter Company Inc., Birmingham. Cost: $1.6 million. A two hole battery of soaking pits is being constructed with the first installation of the new Rust-Escher meallic recuperator designed and produced by Rust Furnace Co., a subsidiary of Rust Engineering Co., Pittsburgh.

Armco Gets More Oxygen

A new automatically operated oxygen producing plant is blowing tons of oxygen into the 14 open hearth furnaces of the Middletown (Ohio) Works of Armco Steel Corp. The unit is part of an extensive modernization program that is aimed at increasing the production and efficiency of the Middletown Works. The facility was built and is being operated by Linde Co., a division of Union Carbide Corp., New York.

When operating at full capacity, the plant can supply about 130 tons of oxygen a day, or about 94 million cu ft of oxygen a month. In addition to supplies for steelmaking, the unit provides oxygen for a new scarfing machine and for cutting, welding, and other operations.

The use of oxygen at steel plants has soared from about 30 cu ft per ton of steel produced in 1930 to a national average of more than 390 cu ft per ton of steel produced today, says Don Holstein, works manager. The Middletown Works uses considerably more oxygen per ton of steel produced than the national average, he adds.

Plans Research Laboratory

Columbia-Geneva Steel Div., U. S. Steel Corp., San Francisco, will build a raw material research laboratory at its Geneva (Utah) Works. The research center will conduct intensive studies on western produced iron ores, coal, coke, and other raw materials used in steelmaking.

Weirton to Start Building

Ground will be broken early in 1960 for the general office building of Weirton Steel Co. at Weirton, W. Va. (STEEL, Aug. 3, p. 69). The building will contain about 150,000 sq ft of floor space and will house all staff and administrative departments. Weirton is a division of National Steel Corp., Pittsburgh.

Plate Plant Will Reopen

A new corporation plans to reopen the Gary, Ind., armor plate plant which has been unused since the end of World War II. Katherine Lapenta, the principal stockholder, says $20 million has been subscribed and "we hope to get into operation in six to eight weeks, depending on completion of the incorporation." The plant is near U. S. Steel Corp.'s Gary Works and would have an annual capacity of about 1 million tons of plates.

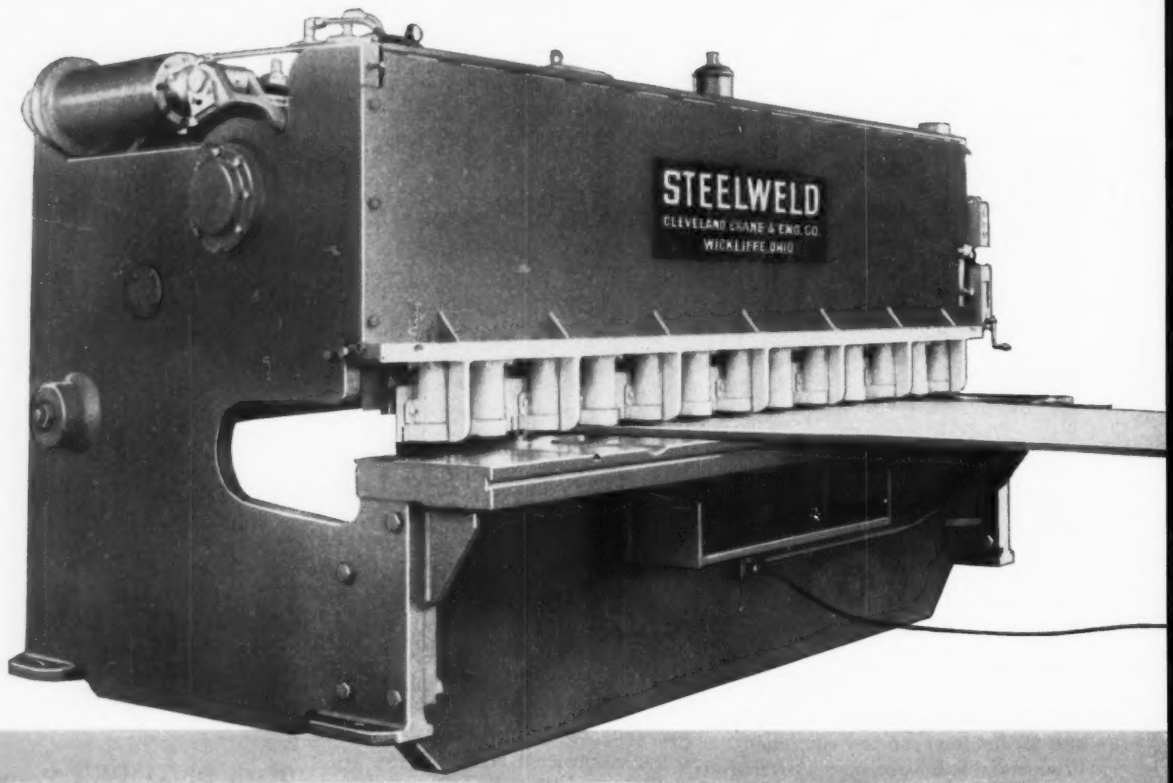
Forms Case Building Corp.

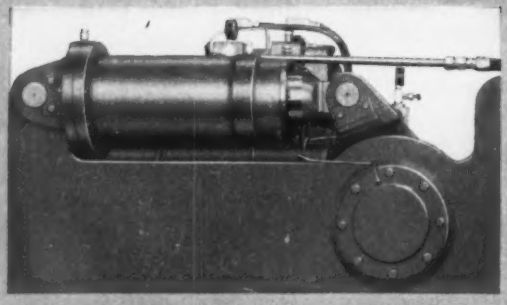
J. I. Case Co., Racine, Wis., has formed a subsidiary, Case Building Corp., to market prefabricated commercial and industrial buildings. About 95 per cent of the building materials will be bought from suppliers, says Marc C. Rojtman, president. The only items Case will

(*Please turn to Page* 124)

Introducing a new line of

STEELWELD Pivoted-Blade



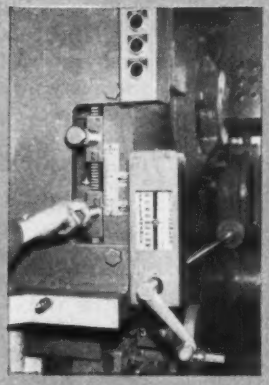


RUGGED—SIMPLIFIED HYDRAULIC DRIVE

The drive is simplified and efficient. Only one hydraulic cylinder is used, as compared to two on other machines. Hydraulic components, therefore, are reduced by one-half. No special circuit is required to keep the blade level. This is taken care of by the mechanical linkage.

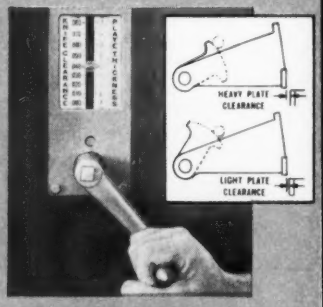
2nd SPEED FOR LIGHT CUTTING—100% FASTER

The single cylinder design provides an important bonus advantage: A second, higher speed for lighter thicknesses. Material up to and including 65% of the rated thickness is cut at double the downstroke full-load speed. The hydraulic circuit automatically changes to a slow speed full-load capacity when required.



CUTTING STROKE QUICKLY ADJUSTED

Both the upper and lower limits of blade travel can be adjusted to suit the work. With the same adjustment, the shear can be changed easily from squaring to slitting operation, or to intermediate position for notching.



FAST KNIFE CLEARANCE ADJUSTMENT ASSURES BEST CUTS

Knife clearance can be adjusted to suit different plate thicknesses. This is quickly done by turning a hand crank at front of the machine. This causes the upper knife to move toward or away from the stationary knife, as indicated in sketches. The scale shows plate thickness that may be cut for any knife setting.

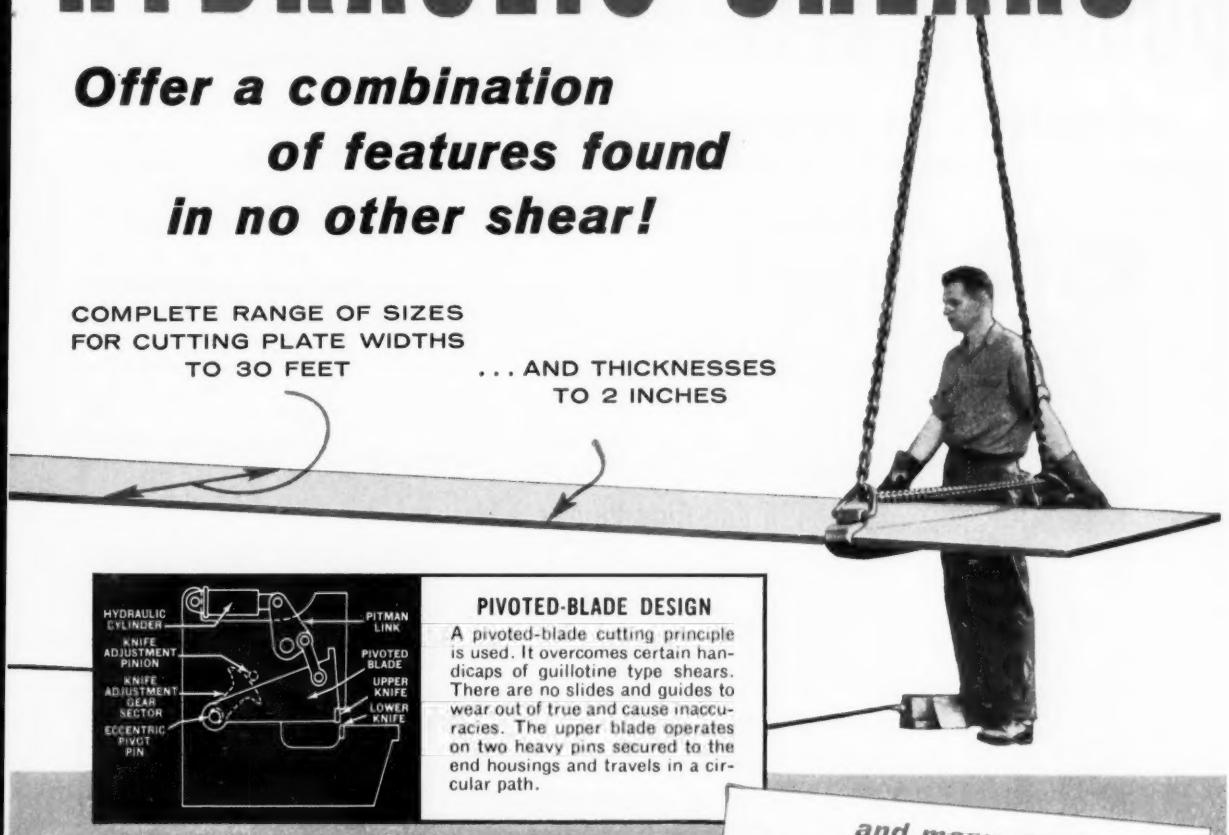
STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7860 E. 282nd St. • WICKLIFFE, O.

HYDRAULIC SHEARS

Offer a combination of features found in no other shear!

COMPLETE RANGE OF SIZES
FOR CUTTING PLATE WIDTHS
TO 30 FEET

. . . AND THICKNESSES
TO 2 INCHES



PIVOTED-BLADE DESIGN

A pivoted-blade cutting principle is used. It overcomes certain handicaps of guillotine type shears. There are no slides and guides to wear out of true and cause inaccuracies. The upper blade operates on two heavy pins secured to the end housings and travels in a circular path.

The Steelweld line of Hydraulic Shears is the newest in the Steelweld Machinery Division's fast growing family of metal forming and cutting machinery.

Entirely different from all other shears now on the market, the new machines have a machinery design that is unique and outstanding. They are replete with features that make metal cutting faster, easier and extremely accurate. Construction is heavy and of highest quality to provide long trouble-free service with minimum maintenance.

The hydraulic machines supplement the fine line of Steelweld mechanical shears, thereby making it possible to offer without partiality the most suitable machine for the work contemplated.

Write for free copy of catalog No. 2030

STEELWELD

PIVOTED BLADE **Mechanical and Hydraulic SHEARS**

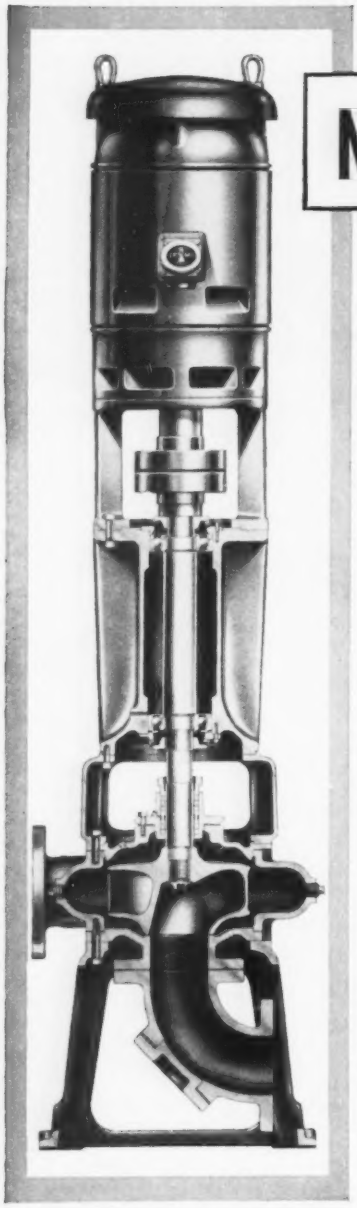
Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

and many more IMPORTANT ADVANTAGES

NO OVERLOAD DAMAGE—Steelweld Hydraulic Shears have uniform overload protection through the entire working stroke.
LOW FIXED RAKE ANGLE—Minimizes twist, camber and bow in cut pieces. Extra heavy power drive eliminates need of adjustable rake angle.
VARIOUS CONTROL CYCLES—Inching control, safety stroke, single stroke repeat, and single stroke non-repeat are provided on all standard machines.
SAFETY-TYPE FOOT SWITCH—Reduces fatigue and speeds operation. Can be moved around to most convenient location.
QUIET HYDRAULIC HOLD-DOWNS—Positive in operation with adjustable pressure to suit work. Heavily protected from damage.
EXTRA DEEP THROAT—24 inches standard. 36 inch throat depth available as extra for some sizes.
SMOOTH WORKING BACK GAUGE—Sturdily built for long accurate, trouble-free service. Ball bearings throughout. Easily operated with hand crank. Motor drive available.
KNIVES EASILY REPLACED AND SET—One man can turn or completely replace knives and make all adjustments quickly from front of machine.
CONVENIENT POWER PACKAGE—Motor, pump, oil cooler, valves, etc., mounted on oil tank and readily accessible for maintenance. May be removed as a unit from machine.
HYDRAULIC VALVES ON COMMON SUBPLATE—Eliminates considerable piping, fittings and bends. Provides an efficient, tighter, hydraulic system. Valves easily removed without disturbing piping.

For higher pumping efficiency

of solids in suspension!



NEW

Fairbanks-Morse

5440A Non-Clog Pumps

Ideal for pumping unscreened liquids with large solids in suspension

- **industrial wastes**
- **sanitary sewage disposal**
- **industrial processes**

Here is your answer to higher efficiencies wherever you are pumping solids in suspension!

All-new Fairbanks-Morse 5440A Non-Clog Pumps feature quick, easy convertibility between any of the many vertical and horizontal types. Power requirements of the pump are always perfectly matched to the electrical and mechanical components. Precision-machined centering fits assure accurate alignment. Exclusive F-M bladeless impeller design minimizes maintenance by preventing clogging from solids and stringy material. The 5440A is only one of many F-M solids-handling pumps designed to meet a broad range of requirements. For information, write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

Ask for new 5440A BULLETIN!

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

ELECTRIC MOTORS • DIESEL, DUAL FUEL AND GAS ENGINES • PUMPS
COMPRESSORS • GENERATORS • MAGNETOS • HOME WATER SYSTEMS

(*Concluded from Page* 121)

make will be the special units to connect the prefabricated sections.

Udylite Research Expands

Udylite Research Corp., a subsidiary of Udylite Corp., Detroit, is doubling its capacity to make chemicals for metal finishing. The firm is installing five new reactor units in its million dollar research center. A 20,000 sq ft addition will be erected at the plant. Cost: $600,000.

Will Make Hatch Covers

Lewis Welding & Engineering Corp., Cleveland, established a Marine Products Div. to handle the manufacture of automatic hatch covers for cargo ships. It will produce a hydraulically operated hatch covering system developed and licensed by Cleveland Pneumatic Industries Inc.

NEW PLANTS

Crucible Steel Co. of America, Pittsburgh, opened a $300,000 warehouse and branch sales office on Boss Road, Syracuse, N. Y. The warehouse has facilities to store about 400 tons of steel.

Eutectic Welding Alloys Corp., Flushing, N. Y., opened an expanded warehouse at 1371 W. Third Ave., Columbus, Ohio. The new facilities are under the management of Virgil Schmarr.

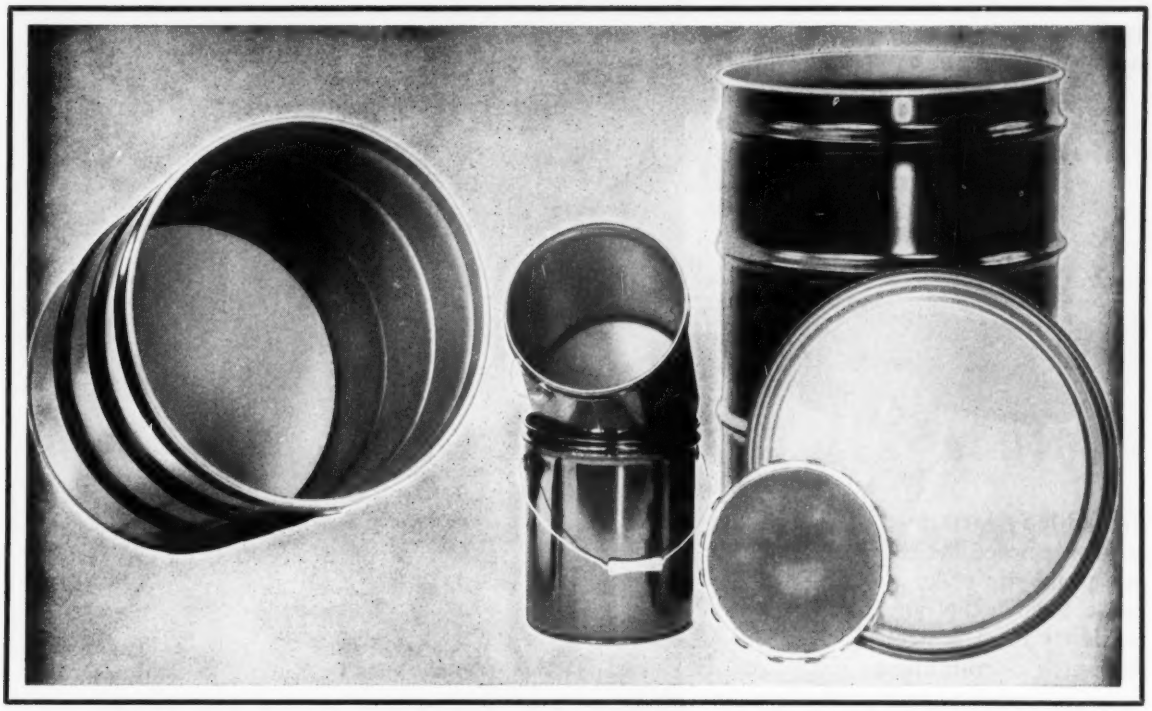
Radio Corp. of America, New York, will build a plant for the manufacture of industrial electronic products in the Washington-Canonsburg, Pa., area. An administration and engineering building of 50,000 sq ft will be built in Chartiers Township, Washington County, Pa. Construction will start as soon as building plans are finished. Expansion will require construction in the near future of a manufacturing center with 130,000 sq ft of floor space.

Lyon Metal Products Inc., Aurora, Ill., purchased a manufacturing plant 18 miles from downtown Los Angeles. The plant covers 160,000 sq ft. Equipping it with manufacturing and finishing machinery

HERESITE

Reg. U. S. PAT. OFFICE

PACKAGE AND SHIP YOUR PRODUCTS IN STEEL CONTAINERS—HERESITE LINED



HERESITE PURE PHENOLIC LININGS

ARE DECLARED SAFE FOR FOOD CONTAINERS

**By The Department of Health, Education and Welfare—
Food and Drug Administration, Washington, D. C., and
The United States Department of Agriculture
Meat Inspection Division, Washington, D. C.**

HERESITE & CHEMICAL COMPANY

MAIN OFFICE & PLANT—MANITOWOC, WISCONSIN

EASTERN DIVISION—GARWOOD, NEW JERSEY

***Canada: Dominion Rubber Company, Ltd.
Montreal, Quebec***

***Europe: Aluminium-Schweisswerk A. G.
Schlieren-Zurich, Switzerland***

NEW Signode air power sealer reduces strapping time

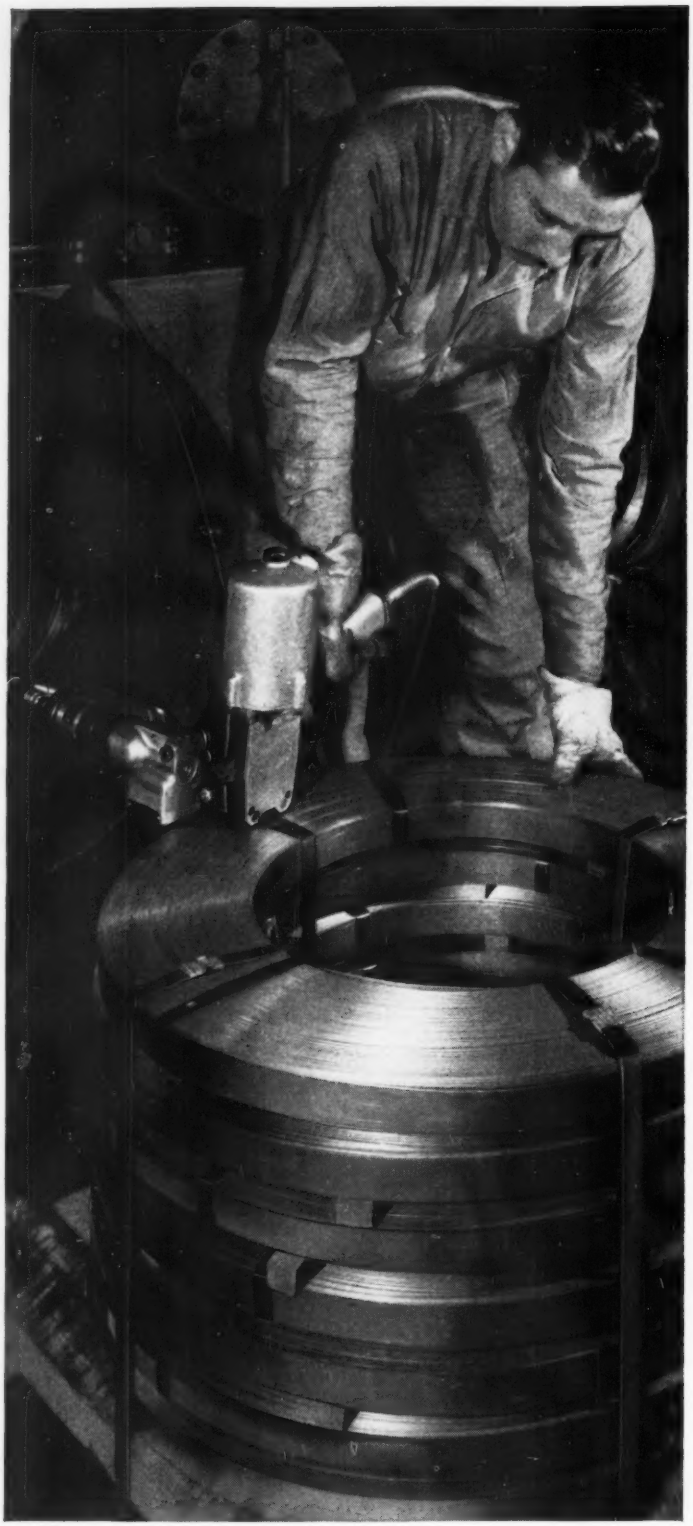
This new Signode Model RCNS pneumatic sealer features a pistol grip that makes it easy and convenient to seal ¾-inch steel strapping with one hand. It weighs only six pounds. The operator simply sets the tool on the seal and pulls the trigger. Compressed air does the hard work—crimps every seal correctly, positively, quickly.

Model RCNS 3435 pistol-grip, air power sealer

For added speed and convenience, the new pistol-grip sealer and a Signode PN air tensioner form a steel strapping combination that is fast, easy to handle, and minimizes waste motion and effort. You get tight, secure bundles every time.

The RCNS sealer is available on an annual rental or single payment basis, as are other Signode heavy-duty steel strapping tools. Let us arrange a demonstration on your premises at your convenience. Just write or call without obligation.

Send for new Booklet SPD 216 that describes the Signode line of air power tensioners and sealers and shows typical money-saving applications.



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First in steel strapping

SIGNODE STEEL STRAPPING CO.

2645 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

will take nearly a year. The firm makes more than 1500 steel equipment products.

ASSOCIATIONS

Election of officers for 1960 will be announced Dec. 17 by the **Illinois Manufacturers' Association.** Nominations are: President, H. B. Smith, Illinois Tool Works, Chicago; first vice president, H. C. Mueller, Powers Regulator Co., Skokie, Ill.; second vice president, L. C. Ferguson, Western Newell Mfg. Co., Freeport, Ill.; and treasurer, H. E. Tonk, Tonk Mfg. Co., Chicago.

Chicago Foundrymen's Association re-elected these officers: President, J. K. Hodgson, Hodgson Foundry Co., Chicago; vice president, H. R. Erickson, Noonan-Malmstrom Co., Chicago; and secretary-treasurer, H. J. Leddy, Joliet Foundry Div., Infilco Inc., Joliet, Ill.

NEW ADDRESSES

Barry Controls Inc., Watertown, Mass., moved its West Coast sales, engineering, and manufacturing facilities to 1400 N. Flower St., Glendale, Calif. The firm makes shock and vibration controls and shock testing machines.

Bickley Furnaces Inc. moved to its new office and factory building at 550 State Rd., Philadelphia 14, Pa. The firm builds high temperature furnaces and kilns. The plant has more than 10,000 sq ft of manufacturing space.

Dow Chemical Co., Midland, Mich., moved its Cleveland sales office to the Illuminating Bldg., 55 Public Square, Cleveland, Ohio.

Hooker Chemical Corp., Niagara Falls, N. Y., announces that nine company officers and certain other corporate personnel will move to its new corporate headquarters at 666 Fifth Ave., New York, N. Y., about Mar. 1, 1960. The New York district sales offices of the Eastern Chemical, Durez Plastics, and Phos-

(*Please turn to Page* 130)

Introducing . . .
Oilmacs!
See? Oil actually runs right off specially treated Oilmacs. As you know, untreated gloves soak up oil like a blotter.

Oil-resistant terry cloth work gloves by JOMAC®

Free sample pair will convince you . . . oil runs off these new Jomac gloves like water off a duck's back! Moreover, Oilmacs are far more cut resistant than expensive leather gloves . . . are interchangeable . . . and can be reconditioned with virtually no loss in oil resistance. Mail coupon now . . . and you will soon start replacing those heavy, oil-soaked gloves with light, flexible Oilmacs!

MAIL THIS COUPON TODAY FOR FREE SAMPLE PAIR!

JOMAC® *Inc.*
Department E
Philadelphia 38, Pennsylvania

I'm interested! Please send free sample pair of Oilmacs, your new oil-resistant terry cloth work gloves.

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For a money-saving balance

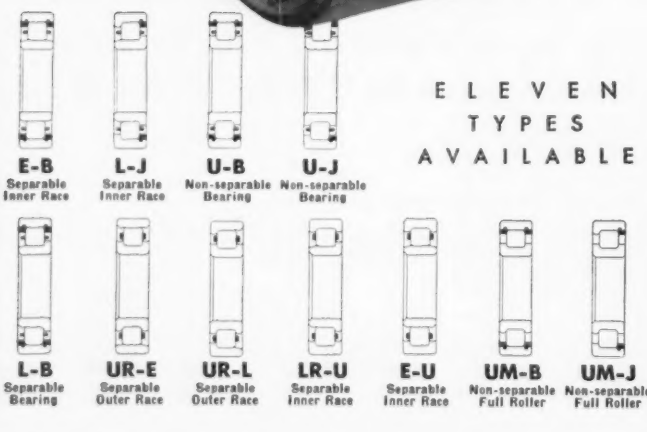
between maximum performance and moderate cost . . .

ROLLWAY
Tru-Rol®
BEARINGS

Give you more for your bearing dollar

For those hundreds of in-between applications where performance requirements are more exacting than those provided by the ordinary commercial bearing, but where maximum precision would be unneeded precision – specify Tru-Rol for the job.

Tru-Rol Bearings provide above-commercial-grade efficiency . . . at worthwhile savings in cost. Internal clearances are closely controlled. Rollers are equally spaced to eliminate- out-of-balance vibration. Each roller is crowned to distribute the load evenly along the full length of the roller. Eleven types available in single and double width bearings, in stamped steel retainer, segmented retainer or full roller construction.

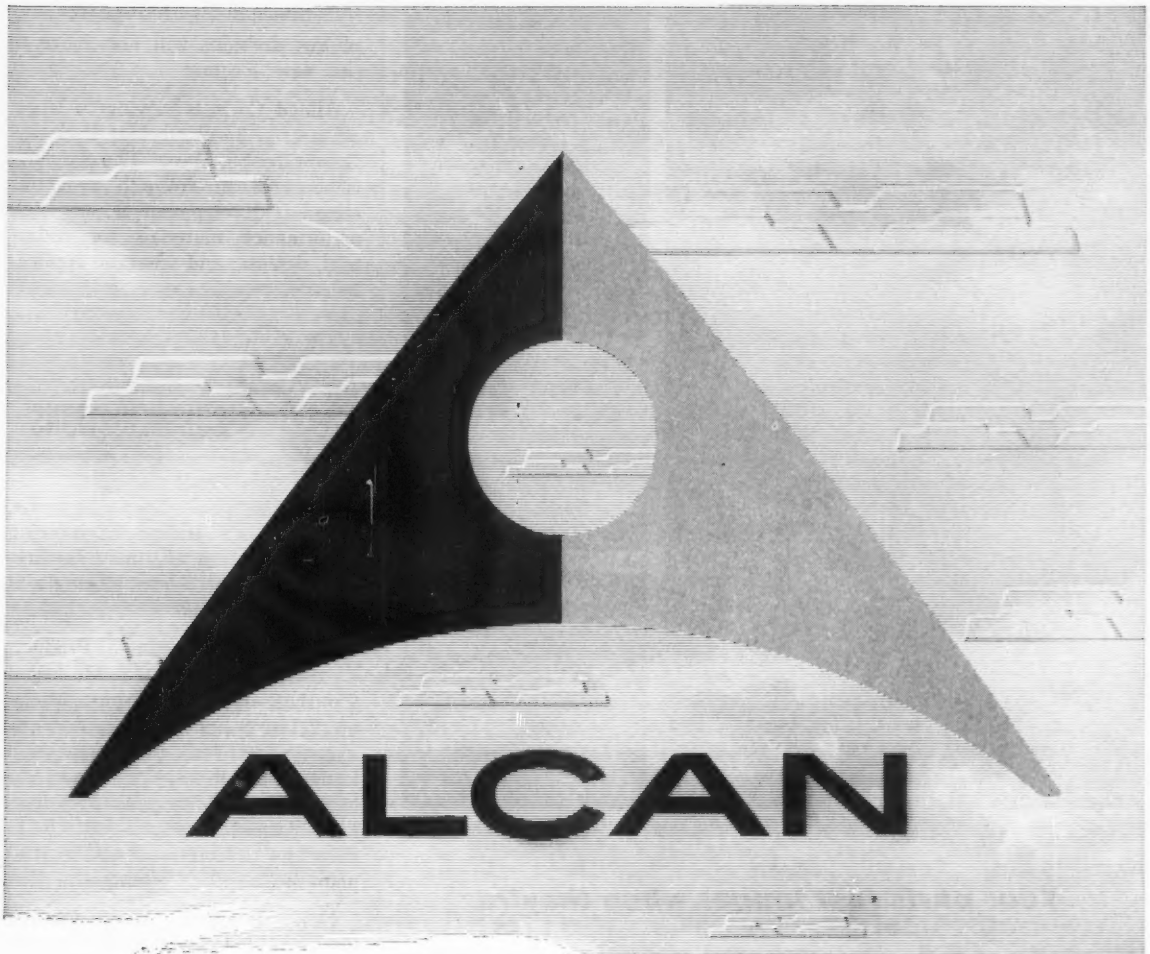


ELEVEN TYPES AVAILABLE

Ask your nearby Rollway Service Engineer to detail the quality you *should be getting* in your "commercial grade" bearings. Or write for the Rollway Tru-Rol catalog showing the full line, and capacity and size ranges. ROLLWAY BEARING COMPANY, INC., Syracuse, N. Y.

ROLLWAY®
BEARINGS
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

ENGINEERING OFFICES: Syracuse • Chicago • Toronto • Cleveland • Seattle • San Francisco • Boston • Detroit • Pittsburgh • Houston • Philadelphia • Los Angeles



Now - a new symbol
for top quality aluminum!

This striking design is Aluminium Limited's new corporate symbol, and your assurance of the finest in aluminum ingot products, service and research.

Like the company it identifies, the new mark stands for primary aluminum with quality assured by Aluminium's world-wide resources: unequalled bauxite and alumina facilities; massive hydro-electric plants and smelters; the latest in research facilities in Canada, England and Switzerland.

For information on how these world-wide facilities can serve you—call our nearest office.

Aluminium Limited

ALCAN

Ingot Specialist...serving American Aluminum Fabricators—

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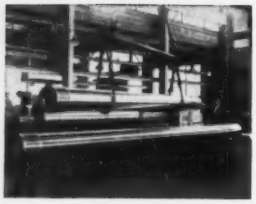
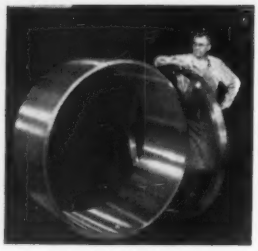
Additional distribution (Alcan Foundry Alloys): **Apex Smelting Co.**, Chicago, Cleveland, Los Angeles. **Charles Batcheider Co., Inc.**, Botsford, Conn. **Aluminum Inc.**, Fort Lauderdale, Fla.





Your parts last longer when they're

SHENANGO CENTRIFUGAL CASTINGS

Your machine parts, ferrous or non-ferrous, are subject to stress, strain and friction, day after day, year after year . . . so specify Shenango . . . and see what a difference this makes!

Shenango's centrifugal casting process insures longer life because of finer, more uniform, *pressure-dense* grain to begin with . . . free of inclusions, porosity, blowholes and other weakening defects. Then, far less machining is needed and your part is stronger . . . to last and last *and last!*

Shenango's modern and fully-equipped shops will supply you with ferrous or non-ferrous symmetrical parts in virtually any shape or size . . . rough, semi-machined or precision-finished to your most exacting specifications. For full details, write: *Centrifugally Cast Products Division,* The Shenango Furnace Company, Dover, Ohio.

SHENANGO CENTRIFUGAL CASTINGS

COPPER, TIN, LEAD, ZINC BRONZES • ALUMINUM AND MANGANESE BRONZES
MONEL METAL • NI-RESIST • MEEHANITE METAL • ALLOY IRONS

(*Concluded from Page* 127)

phorus divisions will also move to the new location.

Alloyd Corp. is moving to larger quarters at 35 Cambridge Parkway, Cambridge 39, Mass. The company is engaged in research programs aimed at development of new high performance materials for industrial, defense, and scientific applications.

CONSOLIDATIONS

Snap-On Tools Corp., Kenosha, Wis., acquired **Judson Engineering Corp.**, Natick, Mass., manufacturer of automotive wheel balancing and aligning equipment.

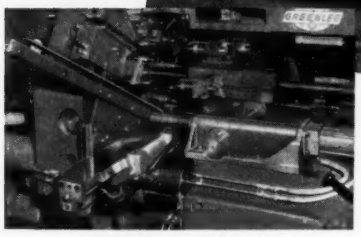
Maremont Automotive Products Inc., Chicago, acquired **Muskegon Camshaft Co.**, Muskegon, Mich., producer of camshafts for automotive, aircraft, industrial, and diesel locomotive engines. Officers of the Muskegon subsidiary are: President, J. M. Comar; vice president, F. L. Flanders; vice president and general manager, Sanford Maremont.

New England Alloy Casting Corp. purchased **Hartford Electric Steel Corp.**, Hartford, Conn., producer of stainless, special alloy, and carbon steel castings. New England Alloy, a newly formed company, is a subsidiary of Quaker Alloy Casting Co., Myerstown, Pa.

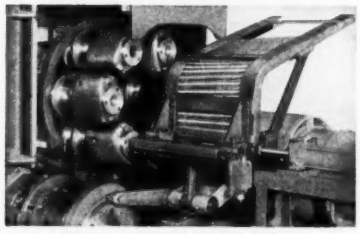
Beckman Instruments Inc., Fullerton, Calif., purchased **Harold Kruger Instruments**, San Gabriel, Calif., and **Tool-Lab Inc.**, Escondido, Calif. The Kruger products (chemical analysis equipment, air pollution monitoring instruments, portable mercury vapor detectors, precision metering pumps, and Teflon connectors) will be added to the line of Beckman's Scientific & Process Instruments Div. Tool-Lab products (precision electric meters) will be made and marketed by Beckman's Helipot Div. which produces equipment for electronic instruments and control systems.

Indiana General Corp. has been formed by merger of **Indiana Steel Products Co.**, Valparaiso, Ind., and **General Ceramics Corp.**, Keasbey,

Second Operation



MAGAZINE LOADING



REAR LOADING MAGAZINE

HAND LOADING

A Method of Machining That Pays Off

Greenlee standard Automatic Bar Machines, adapted for second operation work, profitably machine a wide variety of parts. Long shafts or short pieces are automatically loaded into the work spindle by any of the various loading arrangements shown. Parts are loaded in one position during the machining cycle, and machined in the remaining five cross slide and end working positions. For more information, see your Greenlee Distributor.

GREENLEE STANDARD AND SPECIAL MACHINE TOOLS

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Die Casting Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines

WRITE FOR CATALOG No. A-405

GREENLEE BROS. & CO.

1744 MASON AVE.
ROCKFORD, ILL.

For their own buildings . . .

Businesses That Depend on Efficient Equipment Use

KINNEAR ROLLING DOORS

Men in any branch of building or construction take an extra hard look at the equipment they use. They make it their business to know which equipment performs best and withstands long hard use at lowest cost. That's why builder's own buildings so often feature Kinnear Rolling Doors.

The coiling upward action of the interlocking steel-slat door curtain *(originated by Kinnear)* makes all space around door openings, *inside and outside the building,* fully usable at all times.

Kinnear Motor operators add push-button convenience to this efficiency. You can control any number of doors from a single point. Or you can control each door from any number of convenient points.

This speeds doorway traffic. It avoids bottlenecks. And it promotes prompt door closure — cuts heating and air-cooling costs.

In addition, Kinnear Rolling Doors give added all-metal protection against wind, weather, fire, intrusion and vandalism. *Extra heavy galvanizing* plus the special Kinnear Paint Bond extend this protection through extra years!

Kinnear Rolling Doors, *built to fit any opening,* are easily installed in old or new buildings. Write today for new catalog, or for specific recommendations.

The KINNEAR Manufacturing Co.

FACTORIES: 1780-1800 Fields Ave., Columbus 16, Ohio

1742 Yosemite Avenue, San Francisco 24, California

Offices and Agents in All Principal Cities

N. J. (STEEL, July 13, p. 86). Officers are: Chairman, P. R. Doelz; president and chief executive officer, R. F. Smith; executive vice president, J. H. Bouwmeester; vice president and treasurer, A. J. Astrologes; vice president-marketing, I. A. Dickey; vice president and secretary, C. A. Maynard; vice president-product development, C. L. Snyder; vice president, Dr. E. Albers-Schoenberg; and assistant treasurer and assistant secretary, F. A. Saikley.

All operations of **Universal Clamp Co.**, St. Louis, are being combined with those of **Little Giant Products Inc.**, Peoria, Ill.

NEW OFFICES

Consolidated Electrodynamics Corp., Pasadena, Calif., opened a San Francisco district sales office at 900 N. Antonio Rd., Los Altos, Calif. S. R. Wyzenbeek Jr. is manager of the office which will represent the company's data processing divisions.

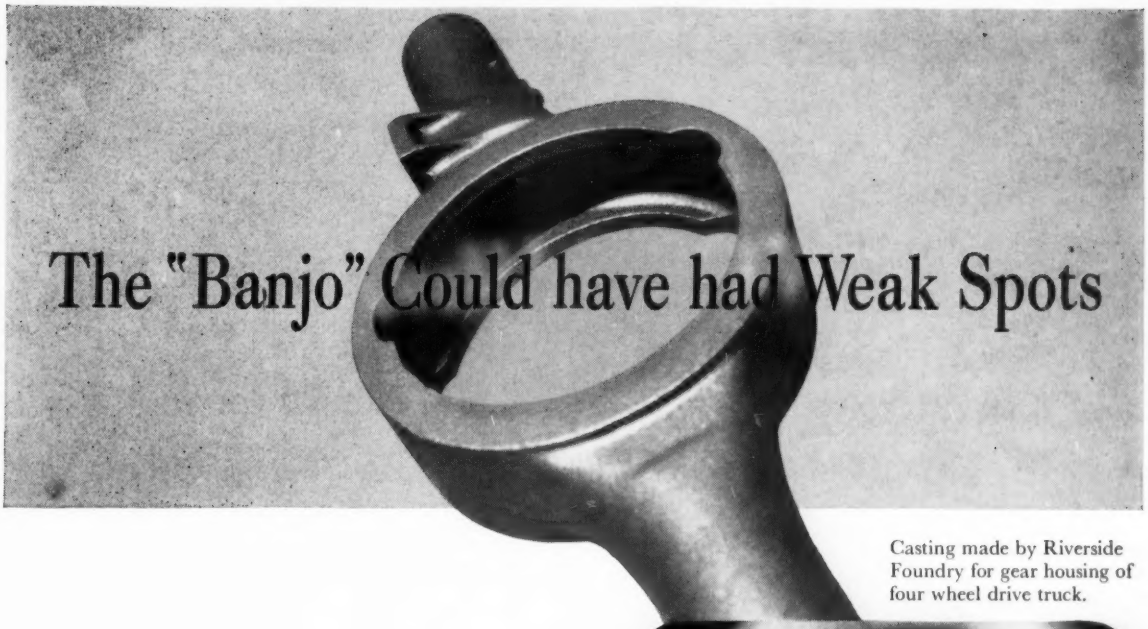
Johnston & Funk Metallurgical Corp., Huntsville, Ala., opened a sales office in Wooster, Ohio, under the direction of R. Edgar Retzler, assistant to Dr. E. R. Funk, president. The company produces foil, strip, and wire in molybdenum, tungsten, tantalum, titanium, zirconium, and other special metals.

Astro-Electronic Products Div., Radio Corp. of America, Princeton, N. J., is opening district offices at 1625 K St. N.W., Washington, D. C., and at 1560 N. Vine St., Los Angeles, Calif. Managers are I. Tipler Blount at Washington and E. L. Knauf at Los Angeles.

Oilgear Co., Milwaukee, opened a district sales, service, and administration office at 4402 Richmond Ave., Houston 27, Tex. Thomas M. Healy is in charge.

High Voltage Engineering Corp., Burlington, Mass., established regional sales headquarters at Redwood City, Calif., under the direction of D. R. Kneeland. The firm designs and makes radiation producing particle accelerators.

The "Banjo" Could have had Weak Spots



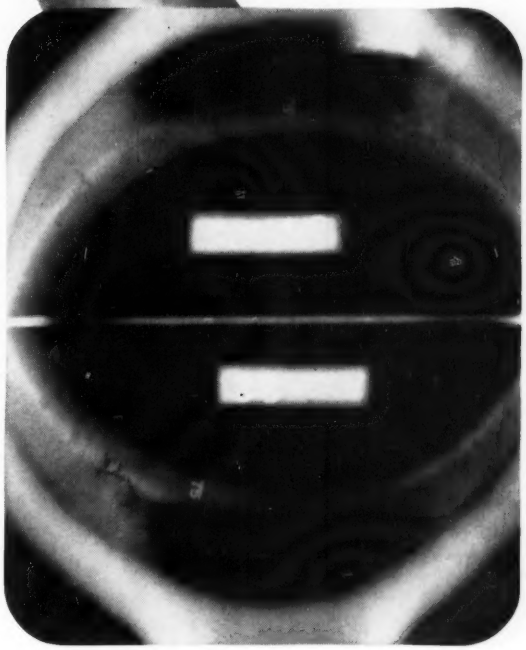
Casting made by Riverside Foundry for gear housing of four wheel drive truck.

Casting this gear housing presented problems. Yet it had to be sound because it was destined for service in rugged, four-wheel drive trucks.

To be sure that it would be ready for its job, the Riverside Foundry, Bettendorf, Iowa, x-rayed the pilot castings. The radiographs showed shrinkage and dirt inclusions. Changes in casting technic followed. Radiography proved the difficulties were overcome.

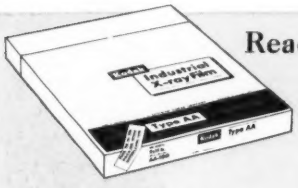
This is another example of how radiography quickly points the way to sound production—provides assurance that only high-quality work is delivered.

This is the way to build business. You should take advantage of radiography. If you would like to know how it can work profitably for you, talk it over with an x-ray dealer or write for a Kodak technical representative to call.



Radiograph reveals shrinkage and dirt

X-ray Division . . . EASTMAN KODAK COMPANY . . . Rochester 4, N.Y.

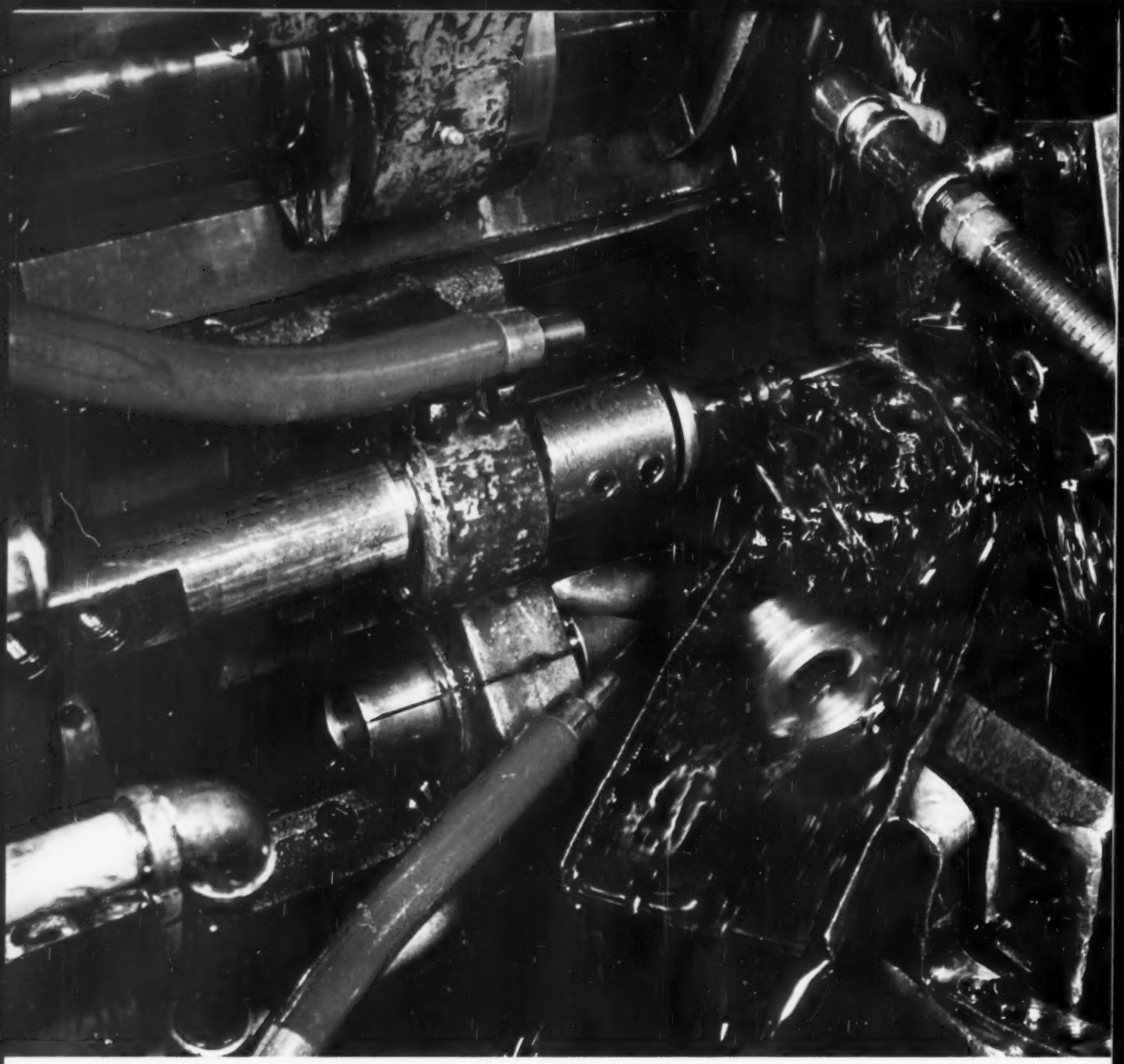


Kodak Industrial X-ray Film Type AA

Read what Kodak Industrial X-ray Film, Type AA, can do for you:

- Speeds up radiographic examinations.
- Gives high radiographic contrast, increased detail and easy readability at all energy ranges.
- Provides excellent uniformity.
- Reduces the possibility of pressure desensitization under shop conditions.

Kodak



Gets closer tolerances, finer finishes, trims cutting oil cost

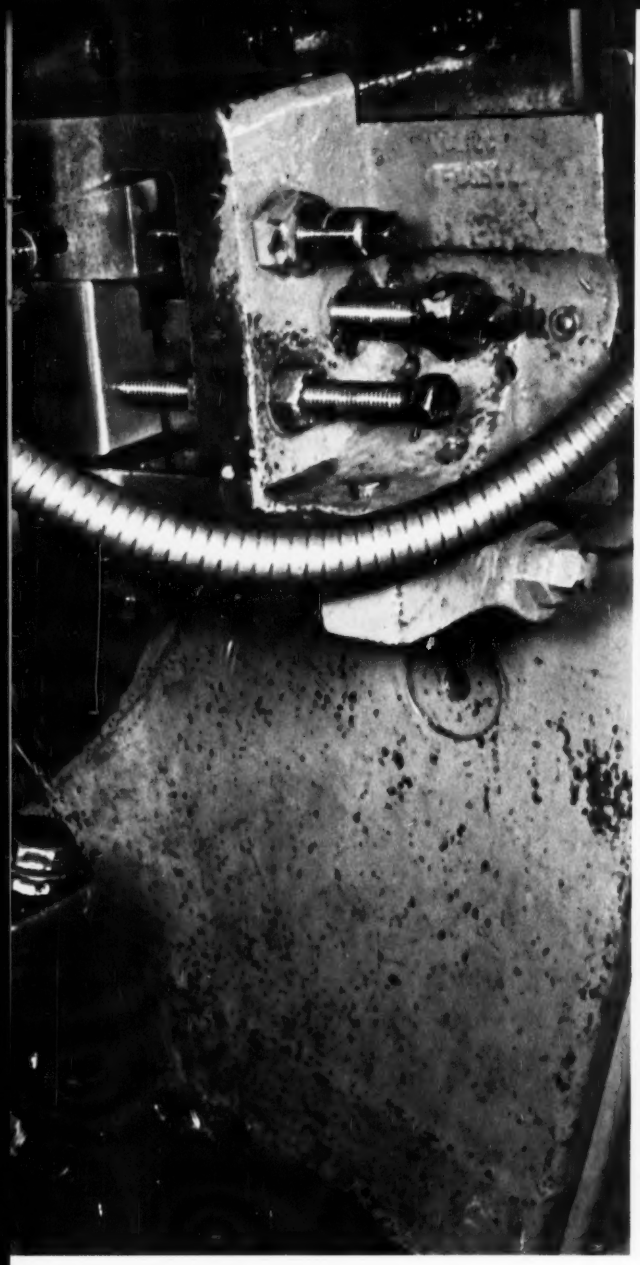
GULF MAKES THINGS

"We've reduced our average annual cutting oil bill 50% —and still hold closer tolerances and get finer finishes on a wide variety of precision machining jobs. We achieved this by using one cutting oil—Gulfcut 41C—which doubles as a lubricant for the working parts in our screw machines—and by using a special filtering system recommended by Gulf engineers."

So reports John R. Scott, Jr., General Foreman in the Production Department of Nippert Electric Products Company, Columbus, Ohio. Their screw machine department turns out precision-made steel cores, vee rings and lock nuts for the Nippert custom commutators and slip rings serving a wide range of industries.

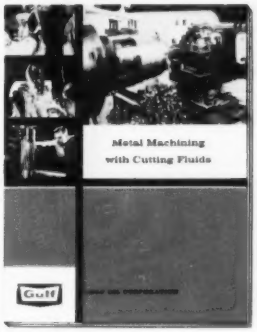
Nippert operates four Acme-Gridley six-spindle automatics, a five-spindle Warner & Swasey, and a single spindle No. 4 Brown & Sharpe for machining these parts. Among the materials machined are Ledloy, leaded C-1116, leaded C-1117 and leaded C-1036. Regular brass is also used for supersonic missile parts.

"Reliable operation at higher temperatures, higher speeds, greater altitudes—these are the demands made on our Nippert commutators," says Mr. Scott. "This in turn means tighter specifications for the machined parts —closer tolerances, finer finishes—and we're getting them with Gulfcut 41C. We also have the added economy of using this same oil to lubricate the machines."



John R. Scott, Jr., General Foreman of the Production Department, with samples of various sizes of Nippert custom commutators.

NEW 100-page manual tells all about selection and usage of cutting oils. Send for your complimentary copy of "Metal Machining with Cutting Fluids."



This Acme-Gridley six-spindle automatic in the Screw Machine Department of Nippert Electric Products Company is cutting a commutator core from leaded C-1036 steel. Gulfcut 41C serves as both cutting oil and machine lubricant.

with Gulfcut®...

RUN BETTER!

In view of this dual use of Gulfcut 41C, Gulf recommended a magnetic filter coupled with a porous bronze filter. This system screens out solids to one micron, according to Otis E. Jeffries, Screw Machine Foreman.

"With this filtering system," says Mr. Jeffries, "we have lengthened cutting oil life, reduced oil-change downtime, and eliminated the risk of abrasive contaminants where Gulfcut is used as the lubricating oil."

Whatever type of machining *you* do, the Gulfcut line can meet your needs. Just call a Gulf Sales Engineer at your nearest Gulf office, or write for complimentary copy of Gulf's new 100-page manual, "Metal Machining with Cutting Fluids."

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

☐ Send literature on Gulfcut oils.
☐ Send copy of 100-page manual, "Metal Machining with Cutting Fluids."

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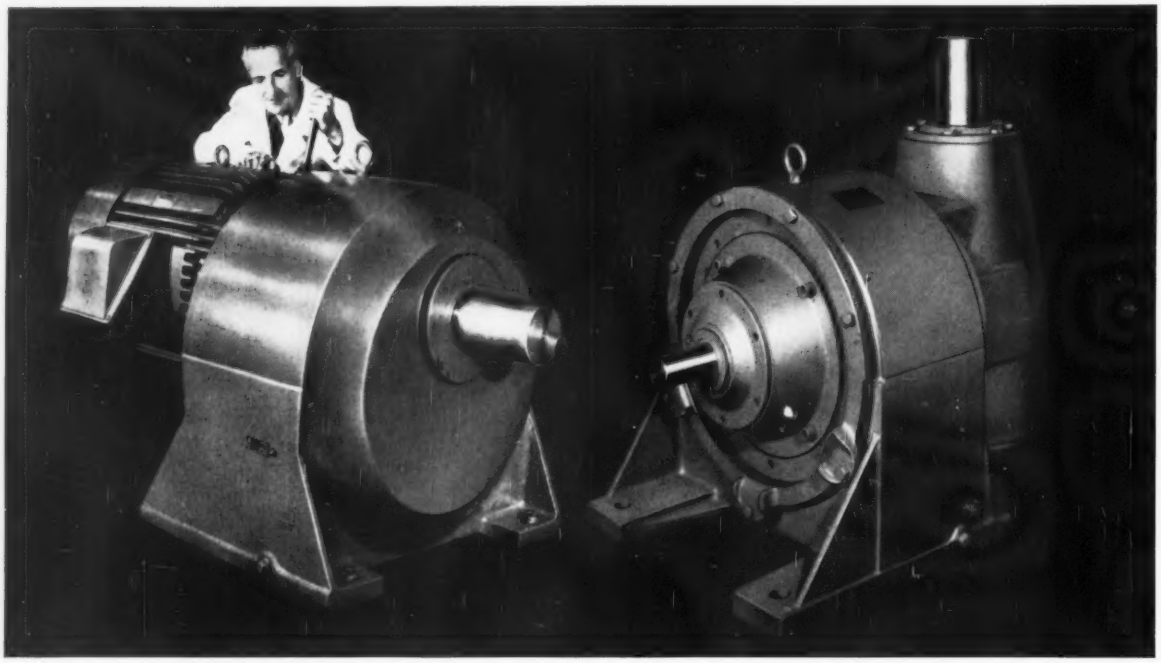

(Left) 75-HP GEARMOTOR.
Application: heavy duty machine tool drive.

(Right) 50-HP IN-LINE REDUCER with right angle attachment.
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DRIVE ON QUALITY—Foremen and superintendents at GM's Cadillac Div., Detroit, are studying motion pictures of its stamping operations. Their aim: Improve operations to boost quality and reliability. Cost is said to be no object.

GEOTHERMAL POWER—Wells drilled in a hot springs area about 100 miles northwest of San Francisco are expected to produce enough steam to supply that city with a fourth of its electricity requirements. A pilot plant will start operating next spring, state officials of the Pacific Gas & Electric Co.

WELD DESIGN BENEFIT—Frames for GMC highway truck tractors weigh 400 lb less than last year's, are 27.8 times more resistant to twists, and 1.6 times better under straight loading, claims General Motors Corp., Detroit. Reason cited: Deep welded, I-beam construction instead of a traditional channel frame.

IMPROVES HI-TEMP MEASURES—A platinum resistance thermometer developed by the National Bureau of Standards works in the 1150 to 1950° F range. It is said to offer greater precision and reproducibility than is possible with present instruments. Drift is claimed to be less than 0.0018° F per hour at 1800° F.

IMPROVED HEAT METER—Some temperature measurement problems will be eased by a new kind of optical pyrometer, says Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill. Claims: It compares two wave lengths being emitted by the source being measured, responds with a linear output signal, is little affected by environment, and needs practically no adjustment or compensation for different heat sources.

ALUMINUM BEARING STANDS UP—Aluminium Ltd. cites several advantages of its 730 alloy: The Canadian firm says it withstands bearing pressures of 4000 psi, lasts two to five times longer than conventional duplex or multiplex materials, is not affected by lubricant corrosives, and operates at slightly cooler temperatures than other bearing metals. The alloy is usually cast.

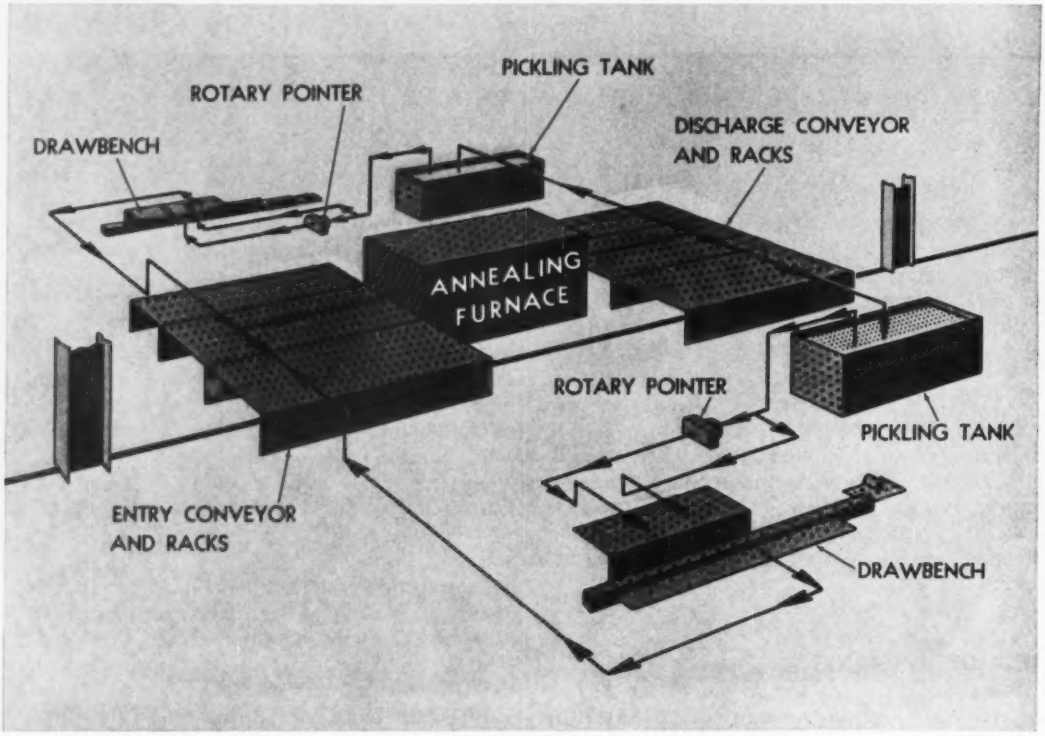
UPPING WELDER HEAT—Temperatures of 90,000° F are expected to be generated by a plasma arcwelding process being developed by Norair Div., Northrop Corp., Hawthorne, Calif. Many current versions have a ceiling of less than 20,000° F.

MINIATURIZES X-RAY TUBE—The application of x-ray techniques in industrial inspection is expected to be extended by a tube that's only 3½ in. in diameter by 13½ in. long. Rated at 100,000 volts, the device was developed for missile and aircraft firms by Radiatron Mfg. Corp., Dallas.

FASTER ANALYSIS WITH RADIATION—The analysis of magnesium oxide content in some compounds used to take 28 hours. A small amount of radioactive phosphorus-32 introduced in the procedure cuts the time to 1 hour, reports the American Society for Testing Materials, Philadelphia.

RECLAIMING BRAZED ASSEMBLIES—Silver brazed pieces which fail in service can often be reclaimed with a stainless type brazing alloy, says Wall Colmonoy Corp., Detroit. Jet turning vane assemblies eroded by high temperature gases are stripped in acid and rebrazed with Nicrobraz at 2150° F in a hydrogen furnace.

COLD FORMS PH 15-7 MO—North American Aviation Corp., Los Angeles, forms PH 15-7 Mo parts at room temperature. After annealing, their temperature is dropped to 700° F. Then they are put inside subzero Kirksite dies for cooling. The final step is subzero aging. Advantages: The method precludes growth, distortion, and warping. Parts can undergo further treating without extensive fixturing.



General layout of loop-the-loop unit shows how tubing recycles through annealing furnace

Loop-the-Loop Installation Anneals Copper Base Tubing

Improved control of atmosphere and cycles is the secret to uniform properties. New furnaces at Scovill Mfg. Co. handle lengths up to 60 ft. One is rated at 15,000 lb per hour

SURFACE characteristics, physical properties, and production levels were considered in building a facility for the production of copper base tubing at the New Milford, Conn., plant of Scovill Mfg. Co., Waterbury, Conn.

To the user, surface finish is important for service and appearance. Surface is also important in plant processing—if it's too rough, final finish is impaired; if it's too smooth, the lubricant will not adhere properly in drawing. Tubing manufacture also requires attention to the inner surface, which is not readily accessible for surface treatments.

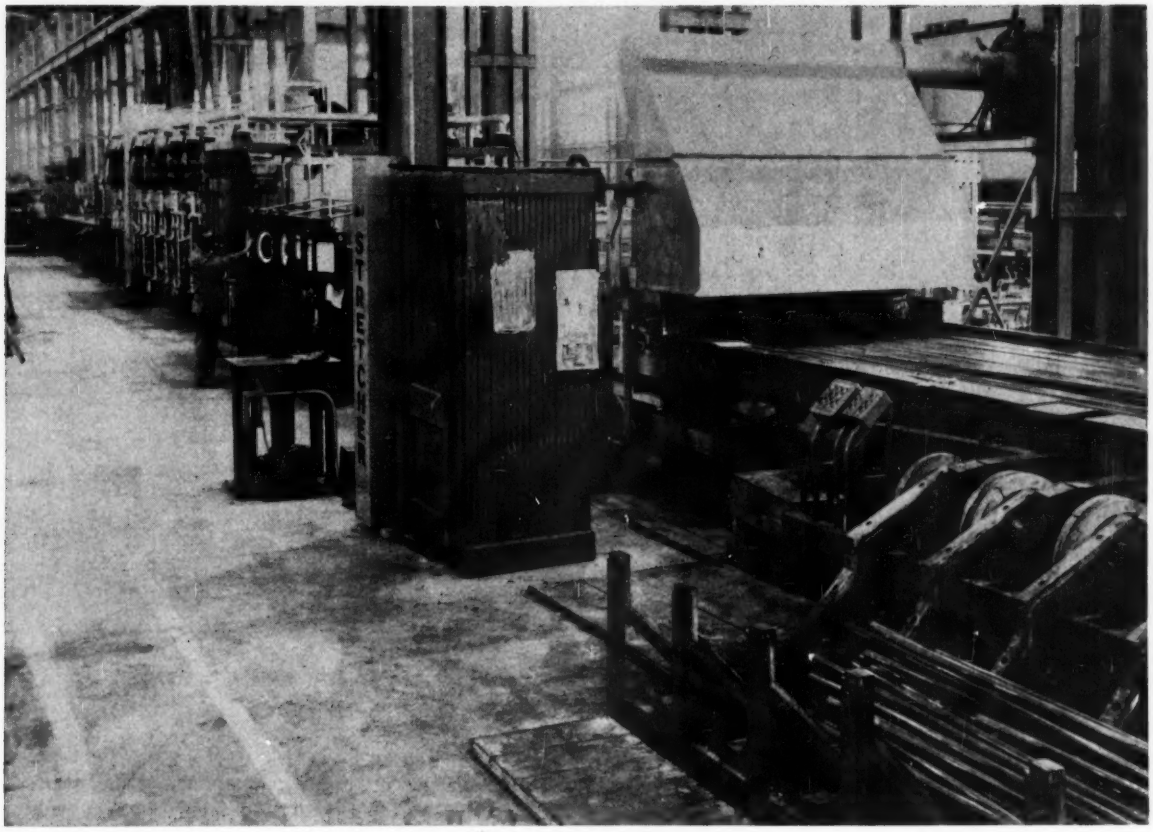
• **Many Sizes** — In planning the mill layout, it was also necessary to consider the wide range of sizes and compositions that are specified.

Gordon E. Signor, mechanical engineer, and Douglas M. Estelle, furnace engineer, Scovill's Mills Products Div., worked with Surface Combustion Div. of Midland-Ross Corp., Toledo, Ohio, which designed and built the furnace equipment. Result: The use of two large furnaces to handle all annealing operations instead of several smaller and less efficient units.

One furnace is used for copper tubing, the other for cupronickel alloys.

Both can handle tubing 6 to 60 ft long.

Most of the copper and brass tubing requires more than one annealing treatment in the various stages of drawing. A single, direct fired, controlled atmosphere furnace handles the annealing requirements of the "redraw" section, which is arranged in a double loop or figure-eight floor plan. Two complete drawing sections, comprising a pointer and pickle tank as well as



Discharge end of 92 ft long redraw furnace. Over-all length, including charge and discharge tables, is 193 ft; capacity is 15,000 lb per hour

the drawbench, were placed one on either side of the annealing furnace. One of the sections is set up to handle larger sizes; the other is planned for smaller ones. The furnace can take the entire range of diameters processed and will do the annealing for both lines.

• **Start with Extrusions**—Extrusions are used as the starting material. The shells, trucked from Scovill's extrusion plant at Waterbury, Conn., are first pickled, then pointed and given a first pass on the new multiple draw benches. If the finished tube is to have a heavy wall and large diameter, one pass may suffice. The bulk of production, in smaller sizes, requires successive annealing, pickling, pointing, and redrawing steps. Finish size determines the number of steps required.

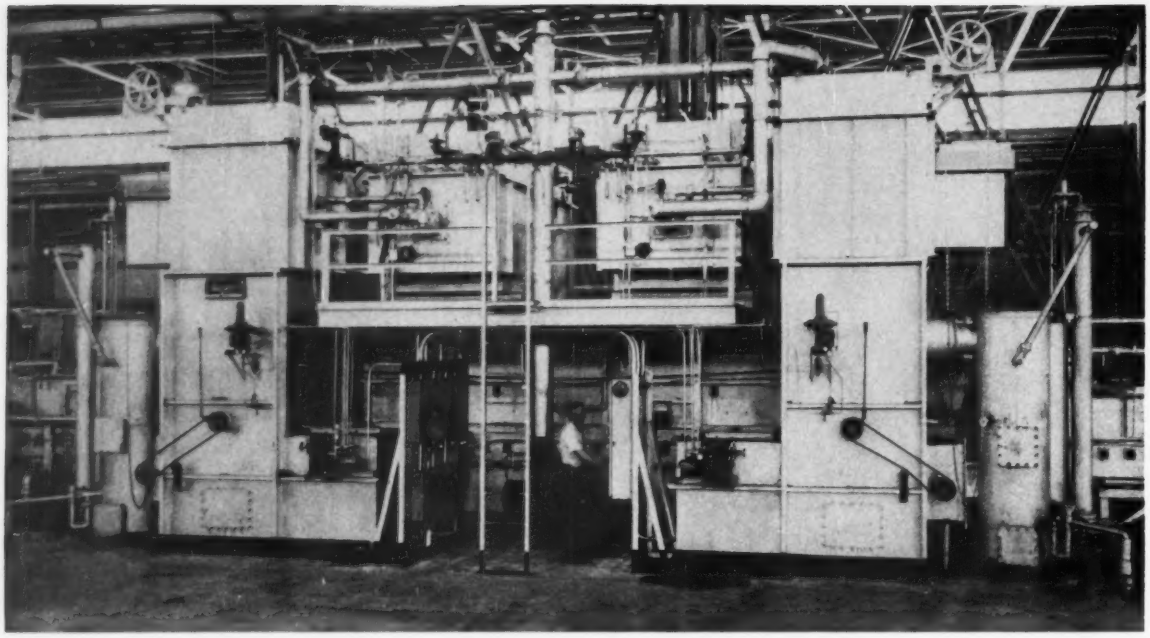
Each drawbench section is designed for a particular size range, to increase flexibility. Larger sizes, whether as finished lengths or for further drawing, are handled in one line, the other being reserved for the smaller diameters. After almost every pass through the draw dies, annealing is required before further reduction can be successful.

The direct fired furnace which serves the two drawing sections is 92 ft long, with a roller hearth, and will heat 15,000 lb per hour to the specified temperature (range is 700 to 1500° F, maximum temperature is 1625° F). Forty-five piloted premix burners fire over and under the roller hearth. The gas-air ratio is controlled by two Askania control systems, to maintain the proper atmosphere in the furnace.

Also a Surface DX generator with a capacity of 15,000 cu ft per hour can be used to provide additional furnace atmosphere. If a slightly oxidized surface is desired for the processing steps, no generator gas is used, and the burner control system is adjusted to provide a slightly oxidizing atmosphere. Bright annealing of brass or cupronickel tubing requires changing the burner ratio to higher gas content, while additional gas from the generator is piped in. There is no access of outside air in either case.

• **Tubes Purged Automatically** — Baffles are placed in the brick lined entry and exit vestibules. They help retain the furnace atmosphere and prevent entry of outside air. The baffles also aid in maintaining a positive pressure in the furnace, which is sufficient to purge the inside of the tubing being processed. Having the furnace atmosphere both inside and outside of the tubing assures that surface conditions will be uniform.

To control heat cycles with greater precision, as well as maintain the desired surface conditions, a precool and a fast cool chamber are located just inside the exit end of the furnace. An additional baffle is between the heating chamber and the



Continuous bright annealing furnace, showing cooling towers and heat exchangers at either end. Capacity of furnace, over 72 ft long, is 8000 lb of tubing per hour

cooling section. The precool chamber has water coils above and below the roller hearth. The fast cool section has four dividing weirs to provide eight cascading sheets of cooling water directly on the tubing as it moves over the rollers. At the same time, four water sprays are driven at the underside of the tubing.

A drive chain and sprocket assembly assures synchronization of the charge and discharge tables which feed and remove the tubing.

Burner placement alone is not relied on for uniform temperature. Three high velocity fans in the furnace roof provide forced circulation of furnace atmosphere. Temperature uniformity throughout the work and furnace chamber is held to plus or minus 8° F. Four Minneapolis-Honeywell indicating controllers give zone control, and an equal number of Alnor high temperature cutoff instruments give additional protection against excessive temperatures. A four-point strip chart recorder supplies a permanent record of the furnace operation. The instruments, including a recording controller for conveyor speed, are panel mounted.

• **Bright Annealing**—The arrangement of the continuous, roller hearth, bright annealing furnace in the finishing line is different: It is designed to use only the atmosphere generated by its burners. To provide a continuous supply of atmosphere gas, the burners must continue to fire most of the time, which might cause overheating under light loads or low annealing temperatures.

Additional furnace load is provided by a chamber which cools the furnace gases, creating a demand for heat even when the furnace chamber and work have reached the set temperature.

The cooling tower is packed with beryl saddles, which distribute a flow of oxygen-free condensate water. The water flows downward over the saddles while the gaseous products of combustion flow upward and are cooled. The cooling water is continuously recirculated through a heat exchanger. When the gas temperature has been lowered sufficiently, the cooling tower is automatically bypassed.

Minneapolis - Honeywell strip chart recorder controllers determine furnace temperature and gas temperature; Alnor high temperature limit controls are installed to shut down the furnace in case of excess temperature. The overtemperature units function by closing a Maxon shutoff valve; after the fault has been corrected, the operator must restart the furnace manually.

A Leeds & Northrup strip chart speed recorder controls and records the conveyor speed and consequently the time work is at heat in the furnace. Close control is important to uniform and proper grain size in the finished product. Although the furnace may be used between 500 and 1400° F, the high volume of gas circulated aids in maintaining a temperature variation less than plus or minus 5° F. Tubing is cooled to 120° F before it leaves the furnace.

In both furnaces, tubing 5 to 60 ft long can be annealed on a regular production basis. Maximum length is set by the length of the charge and discharge tables, minimum length by the spacing between the rollers of the roller hearth which are on 12 in. centers.

Tube diameters being processed range from $\frac{1}{8}$ in. to $3\frac{1}{2}$ in. OD.

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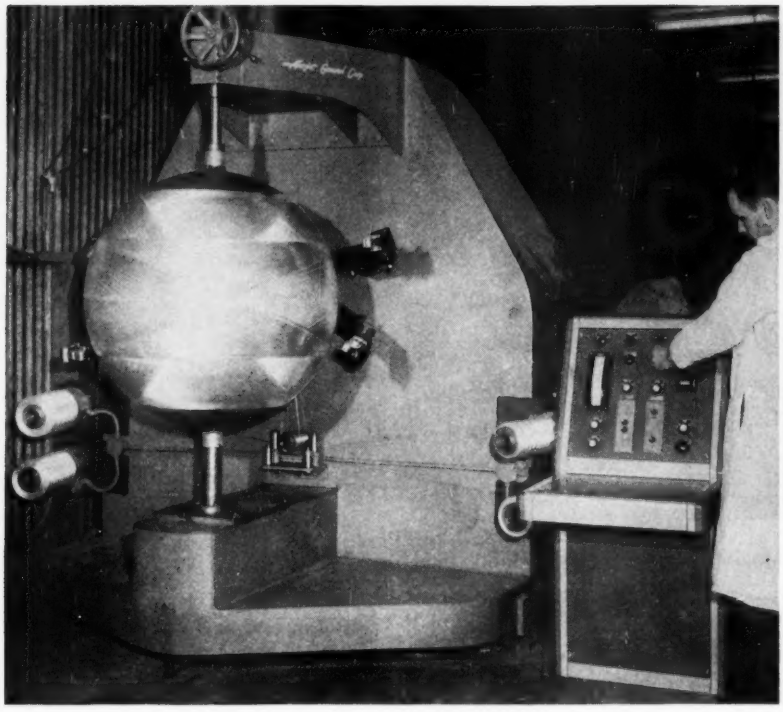


Four cam-controlled arms swing to wrap a spherical pressure chamber. Operating requirements for the chamber dictate the winding patterns used. Parts at right illustrate other wrapped shapes. From top to bottom: A rocket thrust chamber, an exit cone, and a cylindrical rocket chamber

Spun Glass Challenges Metals

It's being used to make pressure vessels and cases for missiles and rockets. The technique: Shapes are spun from glass yarn (or tape) which is impregnated with plastic resin

GLASS is being spun into pressure vessels and rocket cases at Aerojet-General Corp., Azusa, Calif.

The structures can withstand temperatures up to 5000° F for limited exposures. Strengths run to 10,000 psi or higher, depending on the wall thickness.

• Parts are fabricated by winding glass fiber yarn over a solid mandrel.

The yarn (or wider tape) is impregnated with a plastic resin which, when cured, acts as the bond to form a rigid, load carrying structure, explains R. J. Brown, Jr., head of Aerojet's Structural Plastics Div., engineering section.

The pattern of the fibers is dictated by the requirements of internal pressure, external loads, stresses, and deflections. With proper orientation, the extremely high tensile strengths of glass filaments (in excess of 250,000 psi) permit the fabrication of a pressure vessel with minimum weight, says Mr. Brown.

• Winding is done on machines that were developed at Aerojet.

Carriages, controlled by cams, discharge filaments onto the rotating mandrel, often superimposing one winding pattern on another. The resin is applied by passing the filaments through a tank that contains the heated plastic material.

After the winding is completed, the finished part is cured at elevated temperatures, so the bond is firm.

Summing up the implications of the structures, Mr. Brown reported at a recent meeting of the Society of Automotive Engineers: "Reinforced plastic pressure vessels will undoubtedly play a more and more important part in advanced propulsion concepts, not only in pressure vessels and rocket cases, but undoubtedly in many other primary structures."

QUALITY REVIEW COMMITTEE puts checkrein on material costs by double-checking all blueprints before release. Group acts as a clearinghouse for all material problems

Teamwork Puts New Edge on Quality

Cost Crisis . . . How to Beat It

Cutting material costs with the right program helps everyone—from designer to customer. Here are recommendations of experts to help you get your share of the benefits

VENDER CONTRIBUTES his experience too. Quality control man irons out differences. Standards must be workable at both source and receiving inspection

REASONS BEHIND FAILURES and worn-out parts add to total quality picture. Knowing where to alter specifications is vital to system's efficiency

IN CLEVELAND not long ago five men met to find some way to cut the high cost of material for a missile fuel pump.

Incoming forgings were exactly to specification, but 25 per cent were later rejected because machining revealed defects in the metal.

When the meeting broke up, the men had started a routine which paid off with a 93 per cent reduction in scrap, a 20 per cent cut in manufacturing costs, and greatly improved product quality.

Both the company, Tapco Group, Thompson Ramo Wooldridge Inc., and the supplier, Aluminum Co. of America, Cleveland, co-operated in a system which is becoming the pattern for modern quality control: Use teamwork to begin analyzing materials at the designer's drawing board and don't stop until you have examined the worn-out product.

"Everyone benefits," says Hughes Aircraft Co., Culver City, Calif. "The approach cuts rehandling and retesting, reduces rejections and returns, uncovers weaknesses in design and manufacturing techniques, expedites payments to venders, and encourages those who want to supply better quality."

• The advent of automation in production has brought increased need for quality control as a material cost saving tool. "With today's automation, I feel there is as much room for cost reduction by improved materials as there are savings left in increasing over-all plant productivity," states one authority.

To get maximum results, many firms employ a kind of free lance team to analyze material problems. Ford Motor Co., Dearborn, Mich., calls it an "auditor."

The team is separated from the production management function. It includes representatives from engineering, purchasing, receiving inspection, and quality control.

The missile part the Thompson team studied is an aluminum forging. Tiny defects didn't show up until final inspection. After engineering, purchasing, receiving, and industrial engineering were certain they couldn't make further improvements, the group decided to get help from the vender. Together, they studied refinements of the vender's manufacturing and testing techniques. The results were improvements in ingot, billet, biscuit, metallurgy, and nondestructive testing techniques. (A chromic acid dip now pinpoints invisible cracks.)

The added care put quality well above recognized aircraft standards, says Alcoa, and cost Thompson another $20 per forging, but the vast improvement in the rejection rate more than repaid them.

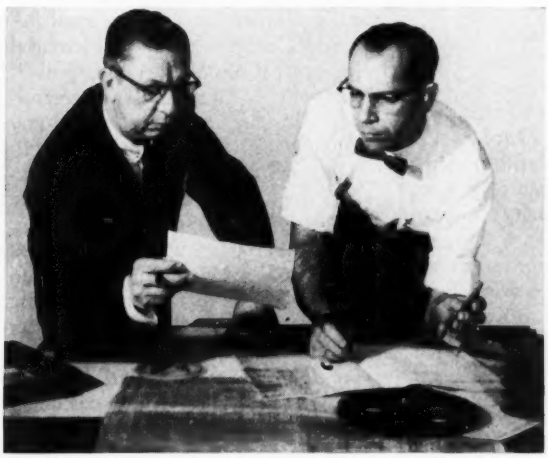
Often, that sort of teamwork shows that you need to invest to obtain a benefit through lowered scrap. Dr. A. V. Feigenbaum, manager of quality service, General Electric Co., New York, says: "Initial costs are almost meaningless. It's the total view that counts —you are kidding yourself when you approach the quality of materials by bits and pieces."

• The system puts a great deal of emphasis on supplier or vender assistance. "As a customer, we draw on the vender's engineering and technical talent to improve our materials," states E. G. Ward, vice president, purchasing, Ford Motor Co.

Many firms use the same team system to call on the vender before purchasing considers a bidder. It makes a complete survey of his facilities and capabilities, and submits a report to the buyer. Armed with that information, he can frequently justify the selection of someone who is not low bidder.

Hughes Aircraft's supplier evaluation system goes a step further: It feeds data to purchasing to establish a supplier's reliability—one division reports a 15 per cent cut in the number of inspectors it needed. "Vender quality performance offers the most fruitful area for applying quality control techniques—it is vital to a firm's profit or loss," declare Hughes representatives.

Kurt Hoffman, assistant director of quality control office, Ford Motor Co., states: "We feel that to thrive in competition, we must excel in durability and reliability." Its venders have already felt the impact of that attitude. Last summer, they were told by Mr. Ward, purchasing vice president, that parts had to match specifications for materials or they wouldn't be acceptable. One



REVISIONS are based on new knowledge accumulated by quality control. Information includes processing data and tests to ease inspection task

FINAL REVIEW evaluates changes, totes up savings. Some firms also use a preproduction test to spotlight hidden weaknesses

reason: Ford's preproduction testing program. First production parts are tried on test vehicles and run more miles than any customer would through all kinds of weather and over all kinds of roads. Suppliers must assure Ford through sample testing that all subsequent parts are to the same standards—anything less is not acceptable.

Ford's quality audit program underscores the seriousness of its purpose. Each division employs specialists who travel continually among supplier plants making spot-checks of processes, inspection frequency and accuracy, and adherence to material specifications. Defaults are noted and brought to the attention of manufacturing, product engineering, manufacturing engineering, production, and quality control.

Another suggestion for cutting material costs through quality control: Use better communications between vender and buyer. "It is surprising how few contracts specify what quality is expected," says one consulting engineer.

• Teamwork plan takes into account the engineering design function which revises specifications based on data furnished by quality control.

J. Kraus, manager, industrial engineering, Tapco Group, Thompson Ramo Wooldridge, says: "All engineering drawings are reviewed by our management team which includes a quality control engineer. Suggestions for changes average 25 to 30 per drawing, each of which could have had serious repercussions."

He adds: "Castings offer many opportunities to apply quality methods." Drawings of many Thompson parts now include reference surfaces for targeting fixtures. Many such parts are purchased with one surface rough machined by the vender, another example of an investment which reaped big rewards.

A fuel booster pump housing had a rejection rate of 50 per cent because of inadequate wall thickness following machining. It is now company policy to specify that many rough castings must have at least one dimension or surface rough machined. Vender and buyer refer to the same rough machined surface to simplify production and inspection. Although a targeting fixture cost $600, Thompson found no further rejections for thin walls.

"That experience also helped our buyer who was a little leery of a vender who asked for tooling money in his bid. He now believes such a vender is more likely to be accurate, reliable, and his proposed product of higher quality than one who fails to ask for such an allowance. This wouldn't have been possible without the preliminary work of the quality team," states Mr. Kraus.

Dr. Feigenbaum supports that view. "We call it source control. Two spring testers, for example, may seem to give identical results, but parts might still be rejected. You must start with proper specifications."

The Tractor & Implement Div., Ford Motor Co., Birmingham, Mich., also cites an example of how standards can be created:

A cast iron transmission case seemed to be up to standard, but the machined surfaces were often too rough. Analysis showed graphite flakes were at the root of the problem. It developed an acceptance standard which defined the microstructure appearance on all areas which specify a microfinish. Result: Improved performance and longer life for mating parts.

Tool life is affected too. Too much mold sand can seriously hamper a cutting tool.

• Control of material costs can be greatly aided by studying warranty expenses and worn-out products.

Quality people are hearing more about reliability. Markets will depend increasingly on product performance, STEEL editors learned. An increase in material costs, if it brings an increased share of the market, can also pay off provided you're willing to measure its effect and wait for customers to learn about it.

Paul Allen, manager of quality control and customer service, Beech Aircraft Corp., Wichita, Kans., says his firm uses three committees to study that phase of material performance: Reliability policy, engineering reliability, and one for operational reliability and corrective action.

The firm also has a touring safety and efficiency clinic which annually provides free inspections for more than 1500 owners. In addition to building customer confidence, IBM tabulations of findings are given to engineering and quality control for further analysis. Forty clinics last year brought these changes in materials: New engine mount bushings, new engine baffles, improved propeller grommets, as well as many other changes in materials.

Ford Motor's angle is to synthesize customer usage before model No. 1 is made. This year's aluminized muffler is one result of that effort. The object is the same: Make the car servicefree for longer periods to increase customer acceptance.

• Engineers predict that within the next ten years we will see a lot more interdependence of engineering and quality control.

Thomas A. Budne, quality control consultant, Great Neck, N. Y., says: "The future of controlling material costs lies with allocating responsibility for quality: Engineering for design quality, procurement for purchased quality, manufacturing for meeting specifications. Managements will learn to assign such responsibilities and learn to enforce them without the crutch of large inspection and quality control departments."

His advice: If you want to reduce quality costs, you must be willing to set up some system to collect, categorize, summarize, and report on scrap, rework, customer service, and warranty costs, plus engineering and inspection time. "Reduced quality costs mean better quality—there's no way around it."

Ken Cochrane, Battelle Memorial Institute, Columbus, Ohio, puts it this way: "Customers and manufacturers are realizing more and more that an investment in reliability is more than balanced by savings in repair, inspection, and a longer product life."

A final bit of advice to venders from Ford's Mr. Hoffman: "Find out what the part you're making is used for. You'll be in a better position to make suggestions for saving material costs. Plan to make a contribution to your customer. Don't be just another cog."

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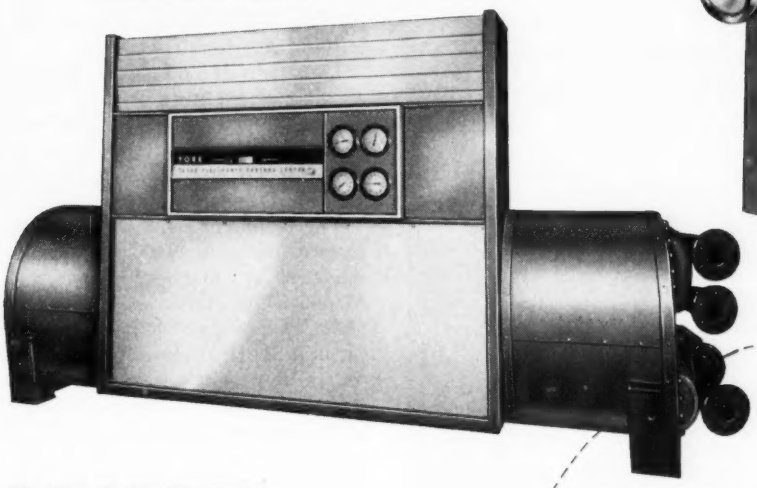
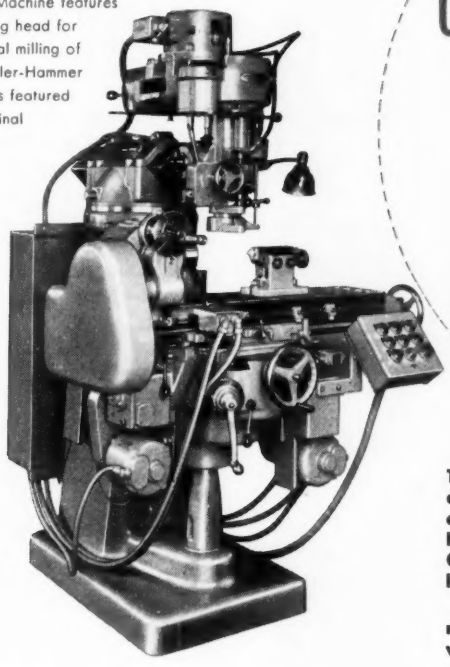
The Reid Brothers Company, Inc. installs Cutler-Hammer Motor Control on their Reid-O-Matic Model 824 Surface Grinding Machine. Fully automatic grinding controls cut set-up time, improve production efficiency.

The York Corporation, subsidiary of Borg-Warner Corp. provides Cutler-Hammer Control on the Turbopak Centrifugal Water Chilling System. The completely integrated Turbopak system simplifies installation, maintenance, and operation.



The Index Machine Company's Vertical Milling Machine features a geared dividing head for automatic vertical milling of spiral forms. Cutler-Hammer Motor Control is featured as standard original equipment.



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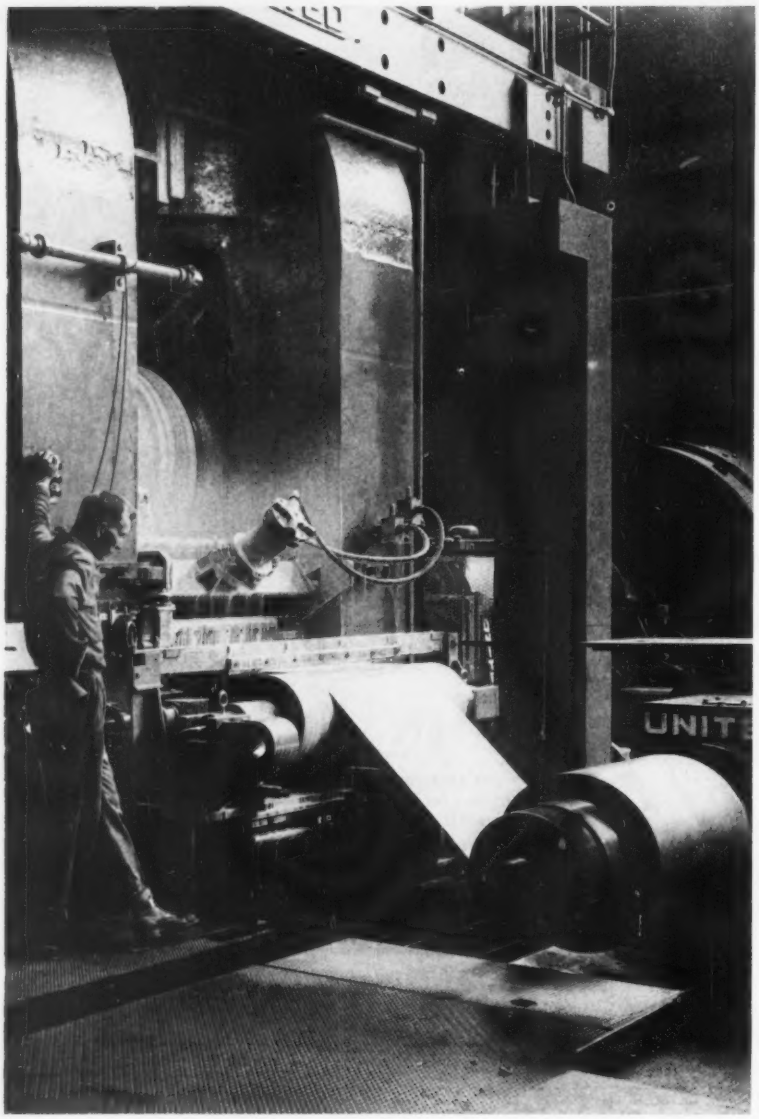
Magnetic Coolant Cleaning Upgrades Cold Rolled Strip

Smudges and pitting are eliminated by removing ferrous particles and tramp oil from recirculated mill coolant; separating units are easy to clean and maintain



MANY STEELMAKERS are using magnetic separators to keep coolant clean in cold rolling mills. Cleaner coolant is helping them produce smooth, smudgefree steel strip.

Armco Steel Corp. is one of the companies that adopted the magnetic units. The separators, installed at the Ashland, Ky., works, were supplied by Barnes Drill Co., Rockford, Ill.

• The company decided to try magnetic separators because most of the contaminants in the mill coolant were ferrous material.

Dirty coolant was causing smudges and pitting on steel strip. Frequent downtime for coolant changes reduced mill productivity. And disposal of contaminated coolant wasn't an easy job.

The contamination was mostly ferrous particles, which could be removed by magnetic separators. Magnetic separators also remove about 88 per cent of the tramp oil (hydraulic fluid from leaky cylinders, squeeze-out from mill bearings, and excess lubricant thrown from accessory mill equipment).

Fine ferrous particles enter suspension in the tramp oil, and the agglomerated mass clings to the magnetic drum in the separator. Then it's scraped off and sent into a sludge discharge.

• Mill coolant was analyzed, and a test separator was installed.

Barnes Drill engineers were asked to design a separator system. They found that the units could be installed on the top of the coolant storage tank. Preliminary tests encouraged them to install a test separator.

At the same time, they took a 55 gallon sample of the coolant for laboratory analysis. They learned that the coolant was 0.238 per cent sediment (by weight); tramp oil volume was 2 per cent. All particles were smaller than 44 microns.

Contamination rate in the mill is slow, and coolant is recirculated at 700 gallons per minute. Engineers were sure the magnetic separators would work efficiently. Particles not picked up on one pass should be stopped the second time through. They expected to remove 1 cu ft of magnetic particles every 8 hours.

• Six separators were installed after

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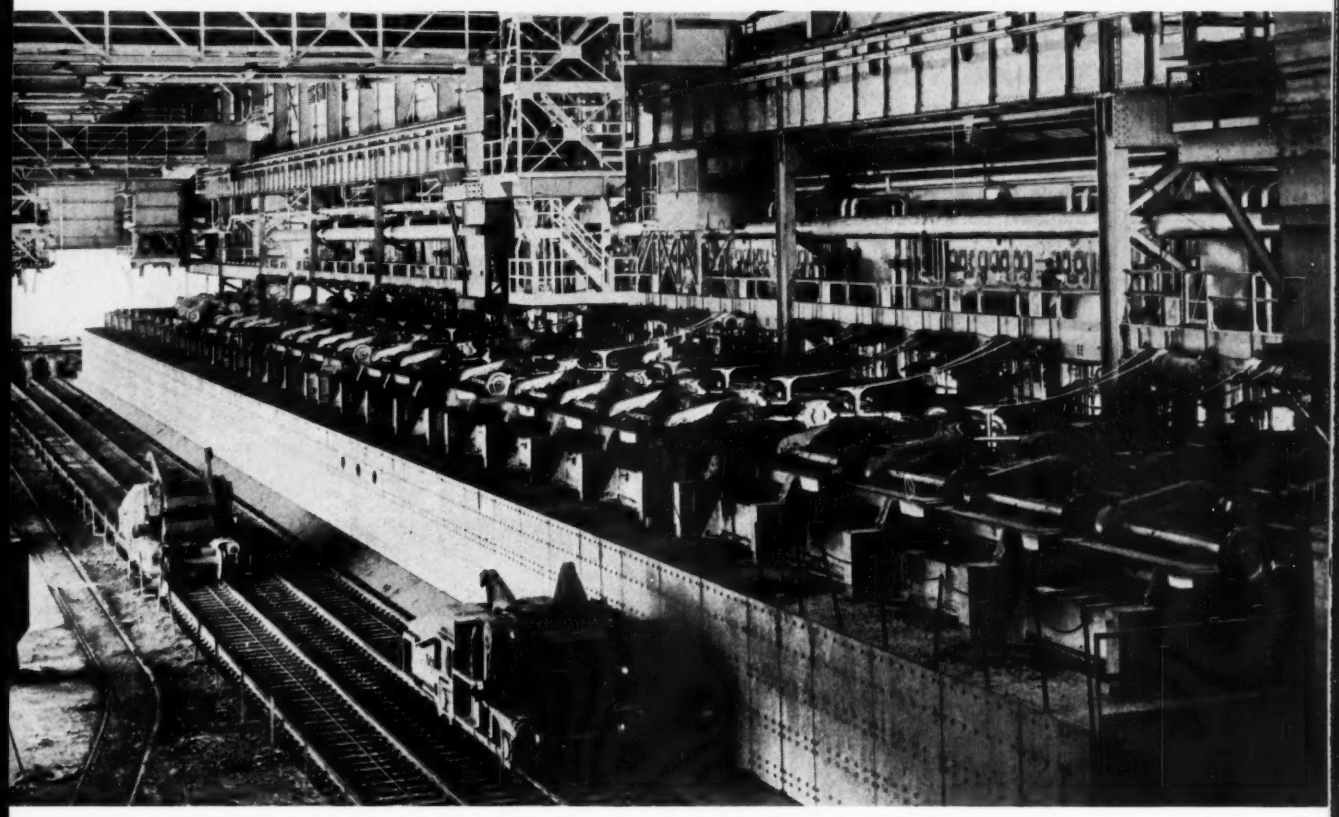

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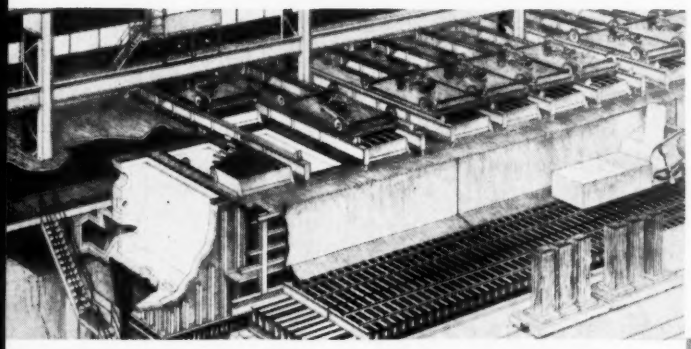
by SWINDELL-DRESSLER



Swindell-Dressler leadership in furnace design and construction for the steel industry is exemplified fully in our many Soaking Pit installations.

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Engineers and Manufacturers

PITTSBURGH 30, PA.

The SWINDELL-DRESSLER CORPORATION of Canada, Ltd.,
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PROCESS

The combination nickel that's making plating history

only from Bi/NICKEL *do you get all these benefits*

1 SUPERB CORROSION RESISTANCE

Under actual exposure to highly corrosive atmospheres as well as accelerated CASS and Corrodkote tests Bi/NICKEL has proven its superiority over other bright nickel coatings.

2 THE MOST BEAUTIFUL FINISH

Color and brilliance obtained with Bi/NICKEL incorporating Udylite Bright Nickel, such as the Incomparable 66 and other Udylite nickel processes, cannot be matched.

3 ADHESION PROBLEMS LICKED

Bi/NICKEL offers a solution to adhesion problems previously considered inherent in combination nickel processes. Chrome finishes "take" to Bi/NICKEL with remarkable facility.

4 FULL RANGE OF COMBINATIONS

There is a version of Udylite's Bi/NICKEL which is adaptable to your product and problem whatever the demands of basis metal or the limitations of your already installed equipment.

5 INCREASED PRODUCT POTENTIAL

Here in Bi/NICKEL is a process that will immeasurably enhance the real value of the products to which it's applied. Longer life of usefulness and beauty can be expected from a Bi/NICKEL-Chromium finish. It gives you a real talking point when it comes to sales.

6 ANSWERS CUSTOMER COMPLAINTS

Bi/NICKEL is a step in the right direction toward solution of corrosion problems that have harassed automotive manufacturers and all others where corrosion has been a factor in a product's "life expectancy".

Discover TODAY how the Udylite Bi/NICKEL process is just what you've been looking for to meet and beat your corrosion problem.

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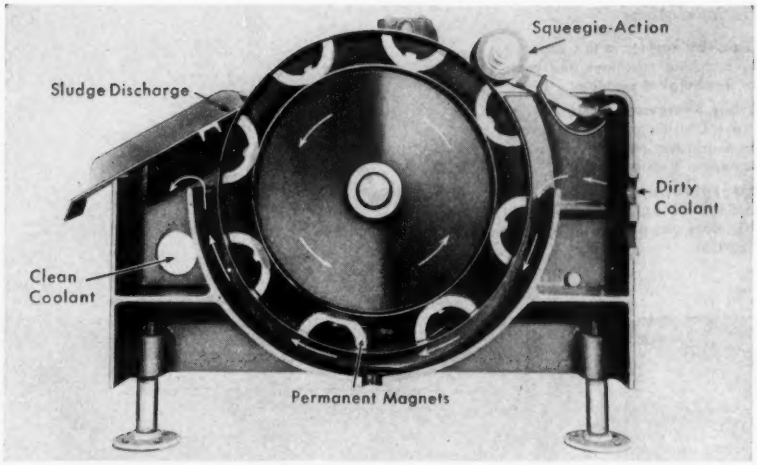


Ferrous particles and agglomerated tramp oil are picked out of the coolant by a magnetic drum (above) and removed by a scraper. Below: Two rows of separators, placed back to back, drop sludge into a conveyor between them

the test unit was operated successfully.

The six units were installed in two banks, with a screw conveyor between them to carry away the contaminant. Tests were continued for three months after the separators were installed.

Coolant samples were analyzed once a week, and a record was kept of the degree of contamination.

Weight of magnetic particles in the coolant had dropped from 0.238 per cent to 0.018 per cent, and tramp oil concentration was 0.50 per cent.

Soluble oil concentration was 1.6 to 6.0 per cent (theoretical concentration: 4 per cent). Oil concentration varies because fresh coolant is added to the storage tank periodically.

• The units require minimum cleaning and maintenance.

Sludge, accumulating at about 3 gallons a month, isn't hard to remove. The coolant is used three to four months between cleanings.

Scraper blade repair was the only maintenance required on the separators after a three month test run. Mill maintenance was reduced substantially because contaminants were kept out of bearings.

Coolant lasts longer; the storage tank doesn't have to be drained regularly. Makeup oil is added occasionally to replace carry-off.

The previous coolant reconditioner had to be cleaned twice a month. The mill had to be shut down 8 hours, and the job required four men. Several barrels of sludge were removed at each cleaning.

Zinc Alloy Dies Tough, Hold Up in Drop Forge

A zinc alloy called Formaloy is saving time and money in dies for drop forge operations, says Martin Co.'s Baltimore Div.

Tests by the company's manufacturing research division show that the material makes tougher dies that last longer than conventional types. It's adaptable for short run operations on steel parts and on aluminum details which involve long runs and difficult or critical sections.

The alloy is produced by Federated Metals Div., American Smelting & Refining Co., Barber, N. J.

Volume Iron Production Justifies HyL Process

Production has passed the 100,000 ton mark at a sponge iron plant in Monterrey, Mexico. The 200-ton-a-day plant has been operated since 1958 by Fierro Esponja, an affiliate of Hojalata y Lamina, a Mexican steel company.

Sponge iron, later made into steel in electric furnaces, is produced by the HyL process, developed by Hojalata y Lamina, with engineering help from the M. W. Kellogg Co., New York.

Another plant, scheduled for 500-ton-a-day operation in early 1960, is under construction at Monterrey. It's being built for Hojalata y Lamina by M. W. Kellogg.

Long Stroke Vibrators Keep Moist Ore Moving

Application of long stroke air vibrators to ore sintering bins, stockhouse bins, and highline transfer cars is announced by National Air Vibrator Co., Cleveland.

The vibrators keep iron ore, with moisture content as high as 16 per cent, moving uniformly through the bins. They strike the bin with a timed, 30 lb impact, dislodging arched material instead of packing it against the sides of the bin.

The one piece vibrator has no body assembly bolts to shear or stretch and no separate striking plate. Only the piston moves.

NATIONAL ACME'S "ZONE OF RESPONSIBILITY"

INCLUDES ALL PHASES OF COST REDUCTION

Check YOURS . . . Then Check National Acme

Direct Costs: these include direct dollar savings as realized by the McCulloch Corporation . . . an "every day" job for Acme-Gridleys.

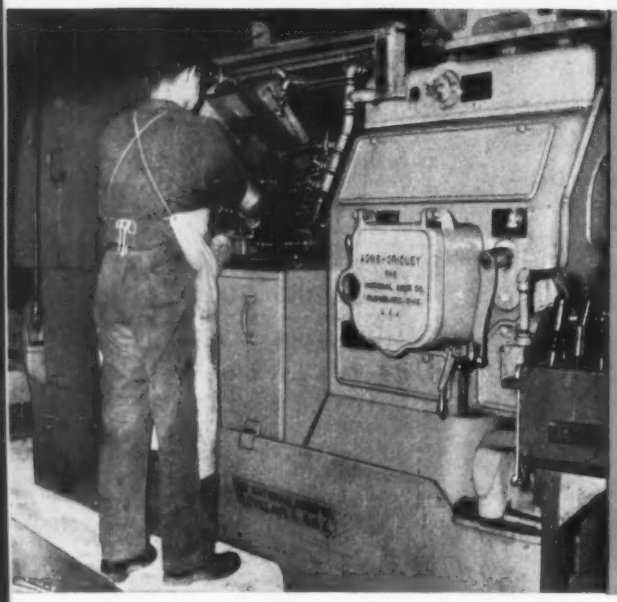
Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc.

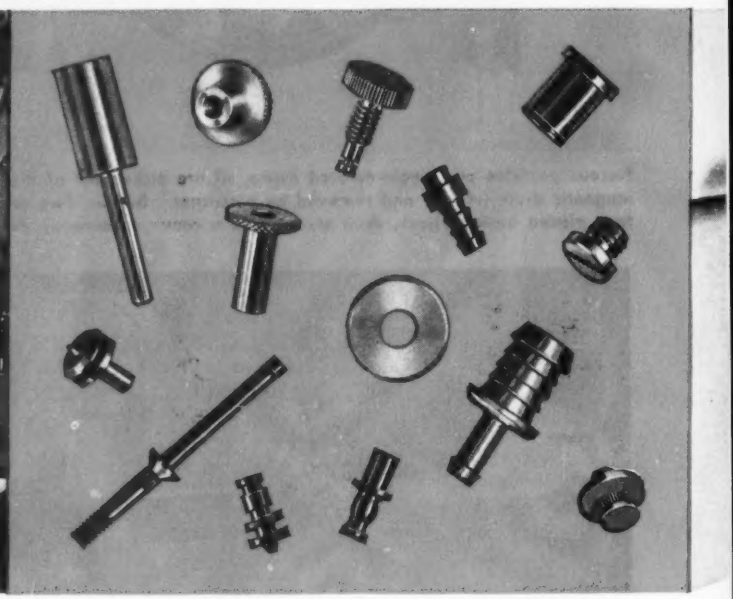
Product Redesign: teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities.

Direct Material Costs: our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems.

Make-or-Buy Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment.

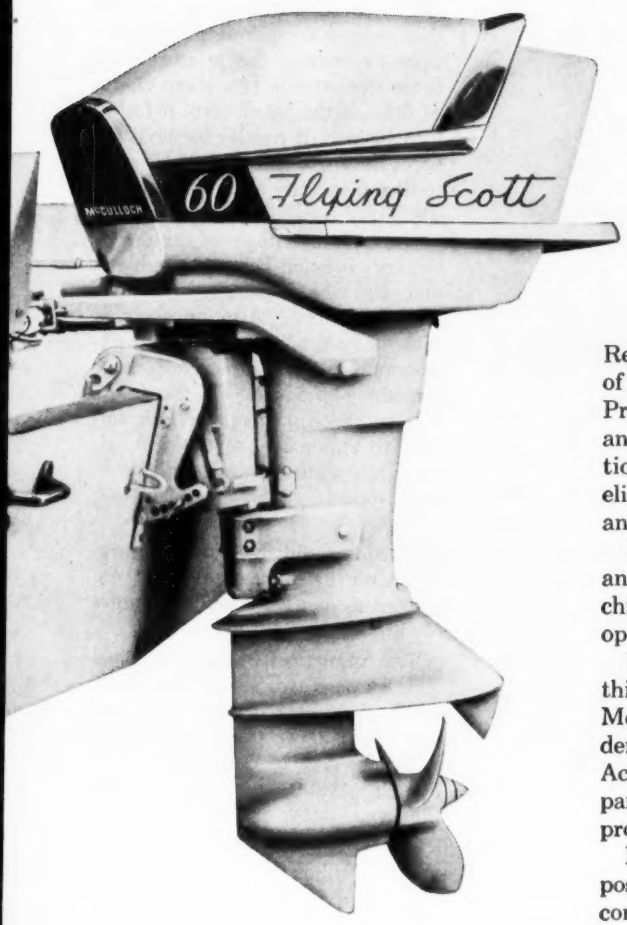
Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.





McCULLOCH CORPORATION LOGS 200% COST REDUCTION

. . . with Acme-Gridleys



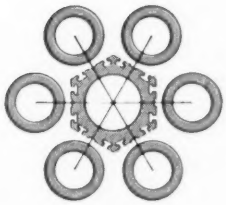
Reduced cost-per-piece of tilt-lock knobs was but one of the enviable savings made possible for the Marine Products Division of the McCulloch Corporation by an Acme-Gridley RA-6 Spindle Automatic. In addition, McCulloch boosted output 200%, practically eliminated scrap losses, and greatly improved finish and final appearance of this small but critical part.

Previous production methods required one primary and two secondary operations. Now, complete machining—including deburring, is done in one automatic operation on the Acme-Gridley.

Dramatic savings in the production of parts like this make Acme-Gridleys a vital, cost-saving cog in McCulloch's highly efficient production set-up. Evidence of this leading manufacturer's high regard for Acme-Gridley efficiency is the fact that 14 different parts for their popular 60HP "Flying Scott" are produced on the rugged, versatile RA-6 Automatic.

It will pay you to thoroughly study the savings possible with Acme-Gridleys. Call, write or wire for complete details on industry's most modern approach to tangible cost reduction.

Pioneer in Circumferential Automation



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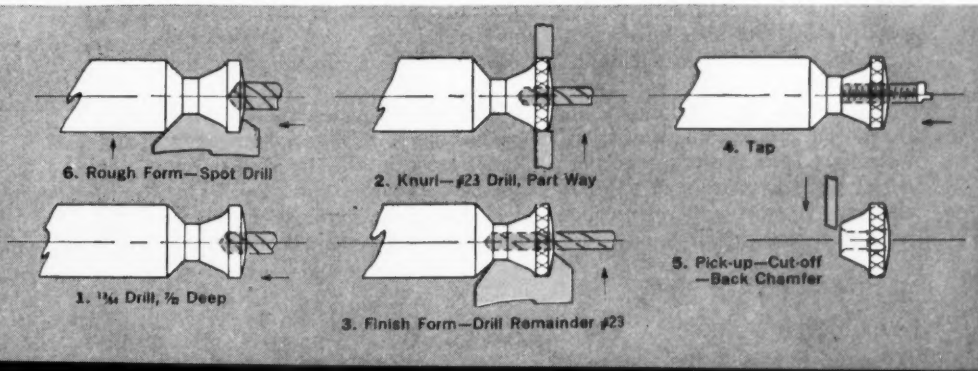
10 Operations

in 5 Seconds


6. Rough Form—Spot Drill
2. Knurl—#23 Drill, Part Way
4. Tap
1. 13/64 Drill, 7/8 Deep
3. Finish Form—Drill Remainder #23
5. Pick-up—Cut-off —Back Chamfer

Explosive Forming . . .

Gathering and drawing effects produce cones (or hemispheres) with walls thicker than original blank. The method appears practical for short production runs, says expert

FORMING A CONE or hemisphere with explosives is a simple, economical way to get around spinning or welding such shapes, believes Dr. H. P. Tardif, Defence Research Board, Canadian Armament Research & Development Establishment, Quebec, Que.

His method permits forming directly from a flat blank, shortening forming time and cutting the number of steps normally used. Result claimed: A more uniform product without defects which could cause a fracture either during forming or in service.

• A slight modification of deep drawing processes permits a kind of metal gathering which produces a cone with walls thicker than the original blank.

The blank is placed inside a cone-shaped die. It rests either on a small ledge in the die wall or on the beveled edge of the blank. Unlike deep draw forming, the blank isn't restricted by hold-down devices and is free to flow toward the apex of the cone under the explosive force. The forming is done in air with no vacuum in the die.

Methods which deform by drawing are limited. Tests of such methods by the Canadian people showed that only shallow bulges were possible—increasing the pressure with larger explosive or propellent charges thinned the blank until it failed. Conclusion: If regular methods are used, the metal isn't ductile enough to flow plastically to the bottom of a die.

One disadvantage of the new method: Friction between the blank and die which inhibits free flow, says Dr. Tardif. Also, an absorber must be used to prevent a slight pitting which the explosive charge sometimes produces on the blank surface. A thin sheet of plastic suffices to eliminate the problem, although a water medium will probably work.

• Hardness and thickness measurements on the shapes produced were studied to determine the mechanics of forming.

The measurements of a formed cone revealed two mechanisms were involved: Metal gathering and deep drawing. For two-thirds of the cone height from its base, the wall thickness is greater than the original thickness of the blank. That decreases gradually to a point near the apex. From there on wall thickness is less, much as it is in a deep drawn specimen. It is worth noting that when the force needed for metal gathering is too great (probably due to friction), the front end deforms by deep drawing. (A lubricant might change that effect.)

Most of Dr. Tardif's work was done with copper, but good results have been obtained with stainless Types 304, 316, and 321. Aluminum 2024-T3 failed, although 1100-H14 and 6061-T6 performed well. Each metal calls for modifications in die design and the amount of explosive used.

Dr. Tardif proposes that the method is practical for small quantity production of cones and hemispheres.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

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By merely picking up your phone and calling your Steel Service Center, you can order for immediate delivery exactly the steel you need.

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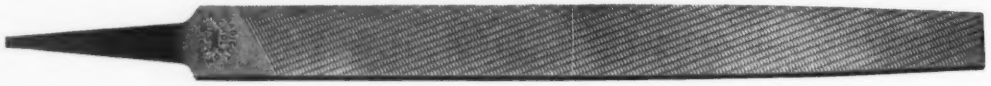
HERE'S THE BEST TRICK YET...THE NICHOLSON "MAGICUT" FILE
THE NEW BOY EXPECTED POP TO PULL RABBITS OUT OF THE HAT
THE "MAGICUT" FILE IS EVEN BETTER... WORKS MAGIC ON METALS
STAN RANDALL



There's a Nicholson or Black Diamond file for every purpose . . . 6000 of them in fact. There's one that's ideal for your metal removing job.

For example, the Nicholson or Black Diamond "Magicut" file is an all-purpose machinist's type. It removes up to 25% more metal with every stroke. This means that by changing to the "Magicut" file, you can reduce filing costs as much as 25%.

The "Magicut's" extra efficiency comes from the unique structure of the teeth. They're on an extreme angle and called "penetrating-planer" type teeth. With each stroke they take a deep bite *and leave a smooth surface.*

You can use the "Magicut" file on all soft or machine temper metals. Ask your Nicholson or Black Diamond file distributor to demonstrate this file. Try it yourself. You'll get faster filing results at lower cost. And remember . . . it isn't a "Magicut" file unless it carries the Nicholson or Black Diamond trademark . . . your assurance of outstanding performance.

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Nicholson File Company, Providence 1, Rhode Island

FILES • ROTARY BURS • HACKSAW AND BAND SAW BLADES
GROUND FLAT STOCK • INDUSTRIAL HAMMERS

Fuel Firing Is Regulated With Automatic Controls

Controls to monitor blast furnace gas pressures have been developed by Hagan Chemicals & Controls Inc., Pittsburgh. They are for a five boiler steam-electric power system at Planta Siderurgica Manuel N. Savio, a steel plant at San Nicolas, Argentina.

Accurate control of blast furnace gas feed to the boilers was a challenge to Hagan engineers. Any drop in gas pressure below blast furnace requirements had to be detected immediately, and gas flow to the boilers had to be shut off. Then the boilers had to be switched over to the next available fuel supply.

The system also had to select fuels for firing in a prescribed order and to suit fuel availability (indicated by fuel pressure).

Hagan engineers developed an electrical-electronic-pneumatic system that responds and corrects rapidly, shutting off blast furnace gas when pressure falls below preset limits. A series of interlocks prevents premature ignition of the main burners.

The boiler system is part of a 53,000 kw power station that serves the steel plant. The turbine is driven by a boiler installation that is fired successively with coke breeze, blast furnace gas, coke oven gas, heavy fuel, and light fuel oil. (Provision is made for future firing of pulverized coal, instead of the heavy oil.)

High Purity Graphite Resists Heat, Erosion

High temperature thermal insulation problems can be handled by a high purity form of graphite or carbon called Pyrographite. It also has advantages for nuclear reactor use where ordinary graphite now serves as a moderator. Other applications: Pyrographite fibers can be used for strengthening alloys and plastics.

At temperatures up to 6700° F, the lightweight material remains strong, chemically inert, erosion resistant, and impermeable to gases. Commercial quantities are available from Raytheon Co., Waltham, Mass.

Brazing machine turntable has 20 stations for loading, heating, cooling, and unloading parts. Inset: Flat face gas burners heat parts rapidly and uniformly

Self-Indexing Brazer Boosts Tank Output

AUTOMATIC joining equipment is winning friends among metal fabricators because of its high productivity and the uniform assemblies it produces.

A self-indexing machine that silver brazes tubes and flanges to tanks turns out 600 assemblies an hour for a leading automobile maker. Two of the automatic brazing units were supplied by Selas Corp. of America, Dresher, Pa.

• The machine requires two operators. It heats, brazes, cools, and unloads assemblies automatically.

Each machine has 20 stations for loading, heating, cooling, and unloading. A water cooled workholding fixture at each station holds the tube and flange in the right position on the tank. Alignment is insured by a device that exerts pressure on the flange as the brazing alloy melts.

Two operators load parts on the machine and see that flux and brazing alloy are available.

• Flat face flames heat parts rapidly and uniformly.

Gas burners that combine positive flame geometry and high flame intensity heat the parts from above and below. A screen on each burner breaks the flame into a number of smaller ones, making a concentrated, flat face, round heating area.

(Advertisement)

The Day Maximation Began

In seeking ways to increase efficiency, production men in the metalworking industry have found elimination of hidden machine tool costs through the use of proper filtration equipment a virtual guarantee of maximum output and economy. This method of obtaining increased production rates is known as *maximation*. Although today, it is one of the most significant factors in determining metalworking profit ratios, the maximation theory and its initial applications were actually developed more than 20 years ago.

HOW MAXIMATION STARTED

A number of months after inspection and delivery of several thousand piston rings to an airplane engine plant, the manufacturer was told that the rings were unsatisfactory and would be returned. Metal particles in the coolant apparently had adhered to the rings during the lapping process and the original high polish finish on the inside of the rings was pitted and chipped on removal from storage. About this time, engineers from the U. S. Hoffman Machinery Corp. were pioneering in research and development of dry cleaning principles for the removal of metal from kerosene coolants. Asked to provide a solution to the problem, they designed a pressure filter system for the clarification of coolants.

THEN AND NOW

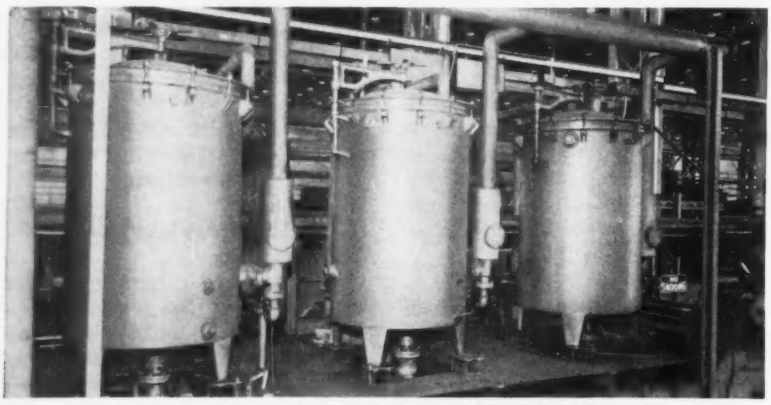
This first filtration equipment by Hoffman was a fantastic complex of pipes and valves. But it did a fine job of bringing clean coolant to the work. A few months later, Fafnir Bearing asked for 2 pressure filters "just like the original." From these pioneering concepts have come Hoffman's modern equipment. Today, Fafnir Bearing employs more than a dozen advanced Hoffman individual and central filtration systems.

At Fafnir and in thousands of other plants employing filtration, coolants and lubricants once contaminated by metallic chips, abrasives and other extraneous dirt are no longer responsible for high production, maintenance and costs, as well as premature obsolesence. Through proper filtration, machines originally designed and tested for peak efficiency with clean lubricating oil and clean coolants can now operate at or near rated capacity. Filtration has made it possible to obtain a 30 to 50% savings in grinding wheels, honing stones, broaches, cutting and other edge tools in addition to providing numerous collateral benefits and advantages.

TYPES OF FILTRATION EQUIPMENT

In making recommendations for solving filtration problems, Hoffman engineers draw on a complete line of equipment which includes;

PRESSURE FILTERS—This type of filter gives up to 100% clarity and is widely used with grinding, cutting and honing oils as well as water soluble oil coolants where finest clarity is consistently required. Easily adapted for large groups of machines. Unlimited coolant capacity.



View of a central pressure filter system at the Plymouth Mound Road Engine Plant of the Chrysler Corp. This system serves a wet grinding department.

FLOTATION EQUIPMENT—Automatic flotation units increase the productivity of machine tools and eliminate down time for sump cleaning. Provide excellent results in steel and cast iron applications with efficiencies of over 98% in one pass. Handles flow rates from 40 to 1500 gpm.

MAGNAFLOW SEPARATORS—Fully automatic and self-cleaning, Hoffman Magnaflo Separators remove from 75% to 90% ferrous solids from cutting oils and water soluble coolants. Flow rate from 40 to 1,000 gpm.

VACU-MATIC FILTERS — For continuous filtering of coolants from *individual* machine tools. Provides unusually high flow rates in continuous filtration of water soluble coolants. Completely automatic and self cleaning. Flow rates range from 40 to 2,500 gpm.

DISC FILTERS — Filter oils containing finely divided particles. Geared for continuous flow.

SUCTION FILTERS—Provide fine filtration on small flow rates for lapping, microhoning, grinding and similar operations. Cap.5-60 gpm.

SUMMING UP

Proper filtration delivering clean coolant makes it possible to achieve maximation with these savings.

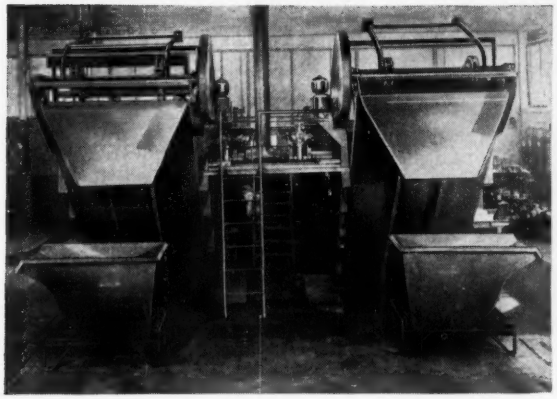
- Greatly reduced down time
- Higher speeds
- Improved finishes—fewer rejects
- Longer useful life of coolants
- Life of edge tools extended
- More sustained tolerances
- Fewer stoppages, adjustments
- Scrap loss considerably reduced
- Elimination of motor pumps
- Curtails bacteria and rancidity
- Saves 25 to 50% in grinding wheels, honing stones, broaches, individual machine tools.

To check on the unlimited industrial applications of individual tool and complete central filtration systems, send for free bulletins and case histories on equipment described above.

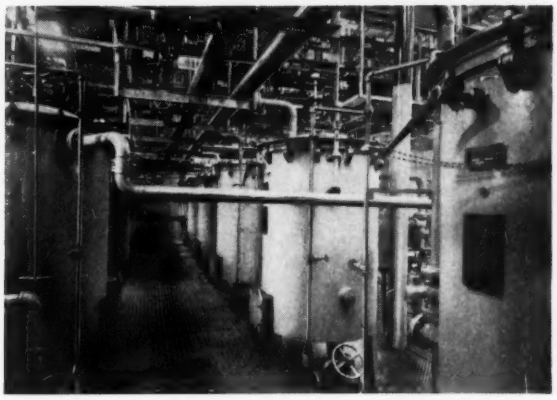
Please write:
U.S. Hoffman Machinery Corp.
Dept. LR, Industrial Filtration Div.
Thompson Road—Plant #1
Syracuse, New York

Today's high production costs dictate a good hard look at metalworking tools and techniques—make a reduction in operating expenditures essential to increased profit margins. Here are typical examples of companies which have obtained maximum production from machine tools by eliminating unnecessary and often hidden expenses through the use of Hoffman filtration equipment.

They're Beating High Machine Tool Costs and Obsolesence



A Hoffman Central Flotation System serving 28 grinding machines at an International Harvester plant. The coolant serving the sickle grinding department is a water-base soluble oil.



A Hoffman Central Filtration System consisting of 9 Hoffman Pressure Filters, Model I-80S, each equipped with Hoffman Dual Magnaflo Plates—with a flow rate of 150 gpm and sludge collector conveyor—(Magnetic separator), are shown at the plant of a leading automotive and aircraft accessory manufacturer.

This system enabled International Harvester to make the following savings:

Cleaning of coolant trenches completely eliminated —savings of $10,000 annually.

Trucking costs for the removal of sludge to a disposal point reduced 65.5%. Saves $8,122.50 annually.

Cost of grinding wheels reduced 47.4% — saves $65,477.19 annually.

Production per grinding wheel increased 134%.

Cost for wheel-change-over reduced 57.3%.

Adding these and others, the total savings for this particular year were significant.

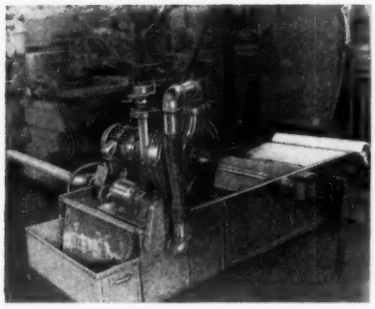
The following tabulation is a percentage breakdown of actual savings made with this Hoffman Central Filtration System equipped with a Magnetic Separator and sludge collector conveyor for automatic removal of sludge collected by filters, magnetic plates and gravity settling.

Grinding Oil 2.5%

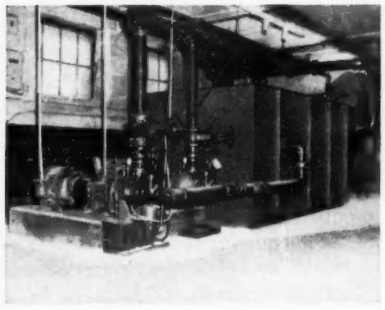
Diamonds—Grinding Wheels 43.4%

Production scrap (resulting from improved quality of product) 32.5%

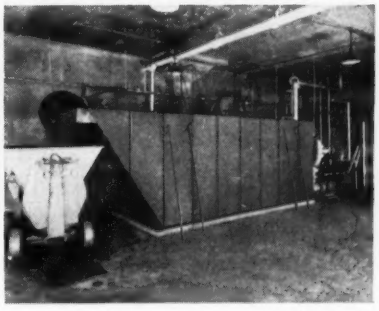
Labor to operate system and actual production labor @ $2.00 per hour 21.6%



A Hoffman Vac-80 Vacu-Matic Filter is shown installed on a Norton 30" diameter stepped-wheel grinder for grinding transmission shafts at the Syracuse plant of a large automotive manufacturer. Most Norton grinders are equipped with Hoffman Vacu-Matic filters when shipped.



At the Union Twist Drill Co. in Athol, Massachusetts, a Hoffman Magnaflo Separator removes metal particles from oils and coolants to solve numerous clarification problems. Result—many money-saving improvements in manufacturing technology and product quality.



A money-saving Hoffman Flotation Unit at the Fafnir Bearing Company. It is designed for plant wide distribution of water-base coolant. The company credits Hoffman systems for great improvement in critical finish grinding operations on bearing races.

Continuous Photostat machine with Microtronics enlarger in place, operator control panel in foreground. Removal of enlarger unit permits photocopying

Microfilm Printing Time Cut from Hours to Minutes

Automated photocopy equipment rapidly produces single or multiple prints from microfilm originals. Same machine copies documents and engineering prints from full size originals

MICROFILM is widely used for active and security storage of engineering drawings. But the reproduction of large size documents on miniature film raises a problem: How to quickly obtain full size drawings when originals have been discarded. Metalworking companies find a constant call for the reproduction of engineering drawings of older equipment.

Heald Machine Co., Worcester, Mass., manufacturer of precision internal grinding, rotary surface grinding, and boring machines, has unknotted the problem with automated copying equipment.

Heald reports:

- Enlargements now take only 8 minutes per copy.
- Labor requirements in the reproduction department are reduced.
- Time is saved in the engineering and production departments.
- For the employee, the installation meant a reduction in the handling of wet prints and contact with chemicals.

• **Microfilm Master File**—For purposes of security and storage, all drawings are microfilmed on 35 mm Filmsort aperture cards. The company's drawing storage vault has a capacity of 250,000 tracings. As new tracings are received, the older ones are destroyed selectively. The microfilm aperture card becomes the only source of reproduction for the older drawings. When a print is needed for engineering reference, or for manufacturing purposes, the microfilm card is retrieved from the files and enlarged to the required size.

Using microfilm, Heald found it was able to store 1 million aperture card frames in one-eighth the space taken up by the 250,000 drawings. But reproducing drawings as large as the original from microfilm posed handling problems. Usually, prints were needed in a hurry, but it took about 4 hours for each enlargement, from request to finished copy. The time-consuming process caused delays in the production and engineering department, restricted the amount of work that could be turned out, and created a labor problem.

Heald concluded that the only solution was some automatic means of making enlargements from the aperture cards, instead of the hand process that was being used.

The problem was presented to the Photostat Corp. of Rochester, N. Y., manufacturer of the Photostat standard No. 4 which was being used in the reproduction department, as well as microfilming equipment and supplies.

• **It's Automated** — Heald's microfilming system now incorporates a No. 4 model continuous Photocopier, which is pushbutton operated. Making prints is a one shot operation. The operator places the subject to be printed on the engineering board, pushes the exposure button, and the rest is automatic—

exposure, cutting off the right length of paper from the roll, developing, fixing, washing, and drying of the copy.

For use with 16, 35, or 70 mm microfilm originals, Photostat supplied a Microtronics enlarger, which is above the engineering board of the Photocopier. The film aperture card is inserted in the enlarger head.

Focusing is necessary only the first time a frame is reproduced. Once the time and light factors are determined, they are designated on the aperture card and all future blowbacks conform to the instructions. The Microtronics enlarger on the Photocopier can also be adapted to project roll (as well as cut) film. Reproductions up to 18 x 24 in. can be obtained. If multiple prints of a tracing are needed, the machine can make up to 120 an hour, merely by setting the counter on the predetermined cycle control.

• **More Uses Found**—New areas of application have also been made possible. The Photostat machine has been used as a supplement and parital substitute for blueprinting and as a copier of documents from departments other than engineering and production.

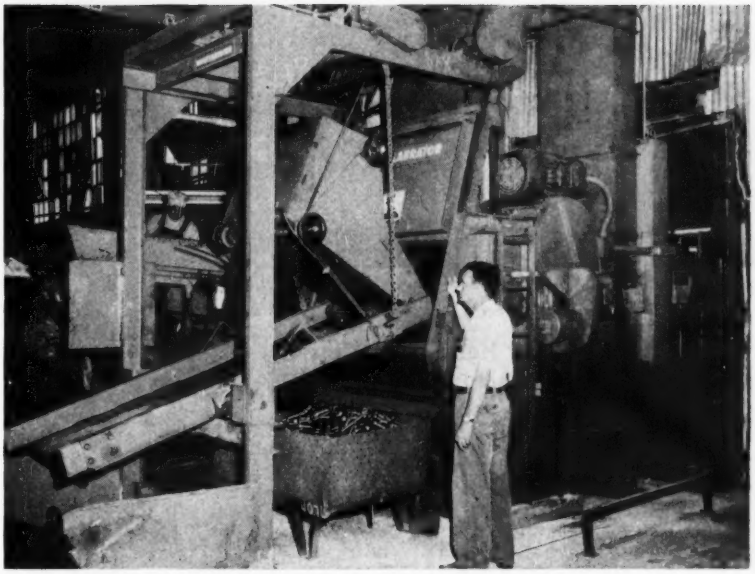
Volume is about 1000 prints per 40 hour week. Eventually, Heald anticipates making 4000 prints in the same period.

"For the versatility that is so important to our operations, the Photostat machine has proved itself many times over," says Philip B. Hensel, supervisor of Heald's Drawing Vault & Reproduction Dept. "Aside from savings in time and labor costs, the machine's most important contribution to our operations has been its help in closing the time gap in our information storage and retrieval system."

Plastic Stops Noise

Incessant bar clatter in feed guides of automatic screw machines can be eliminated by using plastic pipe as a feed guide liner, says A. M. Byers Co., Pittsburgh, Pa.

In addition, nicking or scratching of the workpiece can be eliminated. In some cases pipe can be used to replace the metal guide entirely. The idea is being patented by the company.



Load capacity of the Wheelabrator Super Tumblast machine is 7 cu ft. Here, skip is loading 1800 lb of bolts for 10 minute cleaning cycle

Blast Cleaning Machine Speeds Scale Removal

Forgings are cleaned three times faster; dusty working conditions are eliminated; maintenance takes only 8 hours monthly vs. 20 with previous methods

A BLAST cleaning machine solved several scale removal problems for Vulcan Rivet & Bolt Corp., Tarrant City, Ala.

• **Solutions** — Compared with the previous setup, forgings (bolt and nut blanks) are cleaned three times faster. There is no rounding off or distortion of the hex and square heads.

E. S. McGehee, works manager, describes the machine "as the most troublefree piece of equipment in our plant."

He adds: "We have had a marked improvement in the life of the cutting tools used to form the threads on our bolts and nuts . . . a better product at reduced cost."

The machine (made by Wheelabrator Corp., Mishawaka, Ind.) handles Vulcan's entire capacity in 2½ hours a day, or about 52 manhours a month. The Wheelabrator has a capacity of 7 cu ft.

Former cleaning methods operated a full shift and required 126 manhours each month.

Maintenance now requires 8 hours a month (largely routine inspection). Previously, the job required an average of 20 hours monthly, and the equipment was subject to frequent breakdowns. In addition, dusty, unpleasant working conditions have been eliminated.

ALLEN

The cost of ALLEN Hex-Socket Cap Screws is only a minor fraction of your assembly costs . . . be sure you're getting the timesaving, cost-saving advantages of genuine Allens!

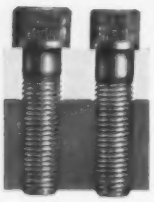
Ever since Allen first produced the hex socket head screw nearly fifty years ago, specifying *genuine* Allens (made by Allen of Hartford) has been a sure way to guarantee dependable threaded fastening.

Only *genuine* Allens have Leader Points that make starting easier, and greatly minimize danger of cross threading. *Genuine* Allens are "pressur-formd" to preserve the long fibers uncut throughout the length of the screw, giving stronger sockets for greater tightening torque.

Write for samples and engineering data. See how *genuine* Allens will make your product better.

ALLEN HEX-SOCKET SCREWS HEAD

Allen's new 1960 Series Socket Head Cap Screws give up to 2½ times more load carrying capacity, without indentation. Head diameter of sizes from ¼" up is now uniformly 1½ times the body diameter—providing more under-the-head bearing surface, and a proportionate increase in clamping force. Write for new Bulletin G-25, with full specifications.



Stocked and sold by leading Industrial Distributors everywhere

ALLEN MANUFACTURING COMPANY
Hartford 1, Connecticut

Vinyl Coated Metal Gains

The trend to vinyl coated steel and other metals assumed commercial importance in the last year, says Edward B. Osborne, market manager, B. F. Goodrich Chemical Co., Cleveland.

More than 30 million sq ft of vinyl coated metal sheets and coils were produced in 1958. Volume is expected to rise to 50 million sq ft in 1960.

The material has already penetrated many consumer product fields.

Radio and television receivers, home appliances, luggage, and even house siding are gaining new dimensions in color, texture, and durability.

In developing the material, Goodrich scientists worked closely with the steel industry; vinyl coated steel sheets are used in several consumer products.

Vinyls are applied to flat metal stock by two basic methods, coating and laminating. The metal can then be sheared, slit, punched, lock seamed, stamped, drawn, or roll formed without damaging the coating.

Properties of vinyl coated metals: Textured and printed surfaces in unlimited colors; resistance to acids, bases, salts, and many other chemicals; abrasion resistance; heat insulating and noise damping characteristics; noncombustibility; easy cleaning and maintenance.

Brine Chilling Hardens, Stabilizes Honeycomb

Brine chilling equipment is being used to harden and stabilize honeycomb wing sections at North American Aviation Inc., Columbus, Ohio. A 26 x 16 x 7 ft chamber (installed flush with ground level) processes mass loads of 14,000 lb in about 150,000 lb of methylene chloride.

In this wing making method, a honeycomb structure is sandwiched between stainless steel plates.

After brazing at 1650° F, the section is air cooled to 100° F, then frozen.

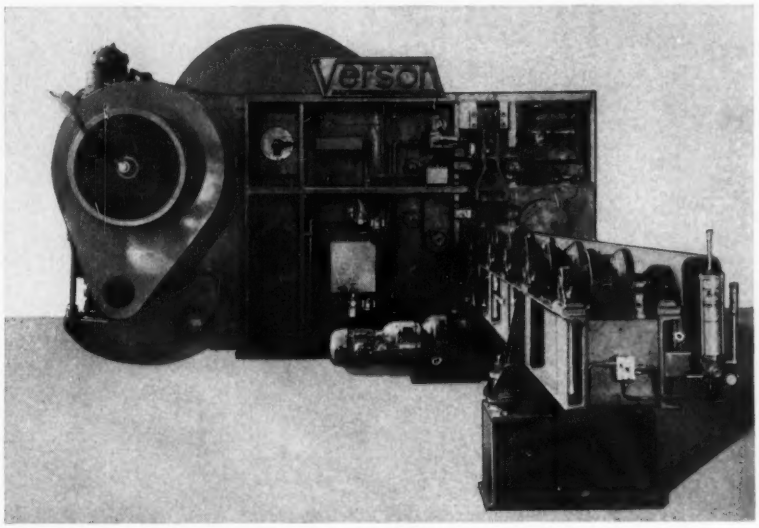
A similar unit for Chance Vought Aircraft Inc. (Dallas) will produce temperatures down to −120° F. Tenney Engineering Inc., Union, N. J., installs the equipment.

Automatic Bar Billet Shear Cuts 4 in. Bars

THIS bar billet shear shears 4 in. round corner square bars (SAE 5140) with a tensile strength of 115,000 psi. It's rated at 700 tons, 1.9 in. up at point of shear.

Production rate is 32 strokes per minute with a 4 in. stroke at the shear point. It can shear billets up to 6 in. long at that speed or an 8 in. long billet at 25 strokes per minute. Weight of sheared billets can be held ±3 oz, says the company. Shear cut length tolerance is ±0.020 in. Minimum lengths that can be sheared are 75 per cent of the distance across flats of round corner square stock or 75 per cent of the diameter of round stock.

For further information, *write* Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago 19, Ill.

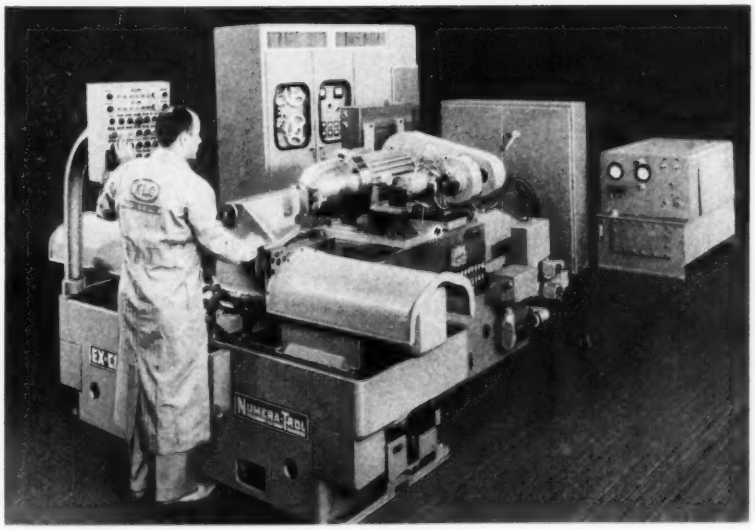


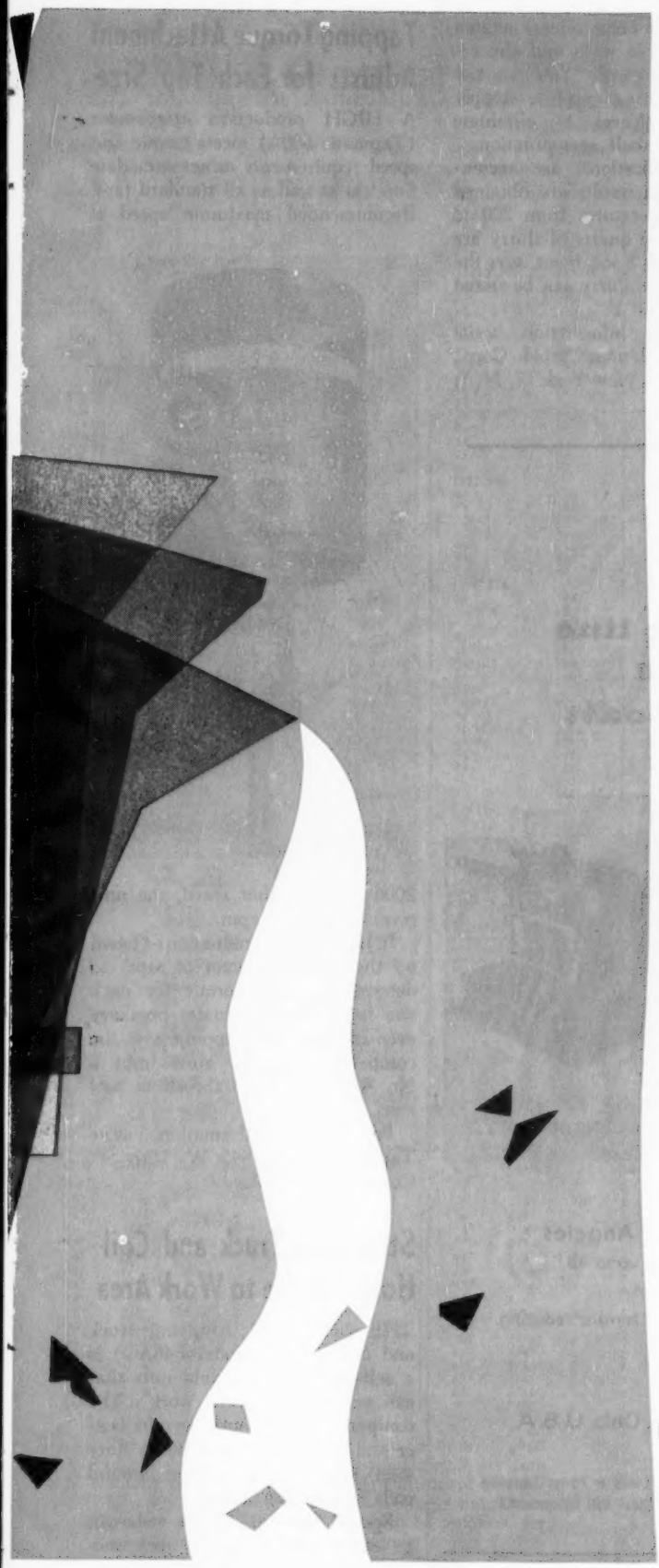
Production Machine Tool Has High Accuracy

THE Numera-Trol 922 contouring machine can do precision boring, turning, and grinding. It can be electronically or manually controlled in increments of 25 millionths of an inch, says the maker.

Hand scraped slide ways have precision roller bearings for ease of movement and quick response to directions from the tape control system. The cross slide (it weighs about 100 lb) requires only 5½ psi to overcome inertia, and 5 psi to maintain movement. Other features include building block design with interchangeable machining units (one for turning and boring, the other for precision grinding). To maintain production accuracy, Ex-Cell-O says the unit should be

(*Please turn to Page* 164)





NEW STEEL PRODUCTION RECORDS WITH KAISER BASIC REFRACTORIES!

KEY TO SIDEWALLS: ". . . Periclase Chrome metal cased keys in upper sidewalls of electric furnace gave best performance we've had – 15 per cent better than any brick used in the past."

FREE FURNACE BOTTOM: ". . . last furnace rammed with Permanente 165 broke its old production record by some 700 tons of steel – more than enough to pay for the bottom."

GUNNING FOR PROFIT: ". . . consumption of K/R 165 Gunning Grains is down to 4.5 pounds per ton compared to 6 pounds for competitive mix – makes it a paying proposition."

DOUBLE DUTY BACKWALL: ". . . backwall with Kaiser PD Brick looks excellent after 125 heats. Orders are not to shoot it, whereas others go out at 60 heats."

EACH of these statements from Kaiser Refractories customers reports a new performance record or production record made possible by changing to a Kaiser Refractories Product.

Why this uniform superiority?

Kaiser Refractories are especially designed for peak performance in specific applications in open hearth and electric steel furnaces. Each is a specially-developed composition, and all are backed by more than 17 years of continuous research and development.

The uniform composition of Kaiser Refractories – your guarantee of dependability – is assured by Kaiser Refractories' fully-integrated facilities. Quality is rigidly controlled from raw material production to assistance in final installation at your mill.

Ask to see the 30-minute color movie, "Progress in Modern Basic Refractories." Arrangements will be made by your Kaiser Refractories Sales Representative.

KAISER REFRACTORIES

Call or write Kaiser Refractories & Chemicals Division, Dept. S9271, Kaiser Aluminum & Chemical Sales, Inc., at any of the Division Offices listed below:

PITTSBURGH 22, PA. . . . . 3 Gateway Center
MEXICO, MISSOURI . . . . . Mex-R-Co Building
OAKLAND 12, CALIF. . . . . 1924 Broadway

MEX-R-CO High Alumina, Fireclay and Silica Refractories

Kaiser Periclase Brick, Mortars, Grains and Ramming Mixes

(*Concluded from Page* 161)
operated at a constant 72° F.

For further information, *write* Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Mold Wash Reduces Flaws

INGOT flaws introduced during teeming of steel can be reduced with a dry, free flowing black powder called "Sinch" mold wash. In slurry form, it helps release molten metal from mold walls and also reduces mold damage. You can also use it for coating graphite stopper heads and sleeves to eliminate freezing and skull accumulation.

Spray applications are recommended. Best results are obtained at mold temperatures from 200 to 400° F. Three quarts of slurry are required for an 8 ton ingot, says the company. The slurry can be stored from 35 to 150° F.

For further information, *write* Silicones Div., Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

Stamco

slitting and coiling line saving time and material in west coast installation

UTILITY APPLIANCE CO., of Los Angeles now has line to handle 20,000 lb. coils up to 48" wide and gauges up to ⅛ inch. Low investment—long life—make this a wise move toward reducing operating costs.

Stamco, Inc., New Bremen, Ohio, U. S. A.

Slitting and Coiling Lines • Cut-To-Length Lines • Flying Shear Lines • Power Squaring Shears • Automatic Resquaring • Corrugating • Culvert • Steel Mill Equipment

Tapping Torque Attachment Adjusts for Each Tap Size

A HIGH production attachment (Tapmatic 500A) meets torque and speed requirements to accommodate fluteless as well as all standard taps. Recommended maximum speed is

2000 rpm. At that speed, the unit reverses at 3000 rpm.

It has control graduations (based on the breakage factor of taps) to determine proper torque for each size tap. This eliminates breakage even in blind hole tapping, says the company. Capacity runs from a No. 4 to a 5/16-18 thread in tool steel.

For further information, *write* Tapmatic Corp., 845 W. 16th St., Costa Mesa, Calif.

Strapping Truck and Coil Holder Move to Work Area

THE Acme steel strapping truck and coil holder (Model E46AO) is a self-contained portable unit that can be wheeled to the work. The company says the unit permits faster and easier loading of heavy duty steel strapping in ribbon wound coils from either side.

Special feature: Guide rods can be easily repositioned to accommo-

G.O.CARLSON Inc.

Mill Inventory of Stainless Steel Plates

Unsheared HRAP Plates

December, 1959

GAUGE	WIDTH	LENGTH
TYPE 17-4 PH*		
3/16	53	113
1/4	74	80
7/16	40/50	50/60
1	26	73
1-3/8	25	85
1-1/2	12	56
TYPE 17-7 PH*		
3/16	65/98	108/210
1/4	63/84	145/240
5/16	68	74
7/16	55	64
1/2	60/96	100/120
19/32	48	120
31/32	24	135
*Trademark of Armco Steel Corporation		
TYPE 302		
3/16	84	195
1/4	96	170
5/16	96	280
3/8	84/96	260/350
1/2	96/97	280/310
5/8	96	290
3/4	60	96
1	96	186
1-1/4	62	330
1-1/2	36	150
TYPE 304		
3/16	80/104	160/300
1/4	72/103	270/300
9/32	80/100	195/240
5/16	84/106	240/340
11/32	60	310
3/8	95/110	240/300
7/16	92	200
1/2	84/96	155/300
9/16	92/96	240/330
5/8	96/100	240/340
11/16	84/96	105/140
3/4	68/96	230/305
13/16	98	282
27/32	96	145
7/8	96/98	184/320
29/32	100	345
15/16	96	210
1	96/98	230/440
1-1/8	96	325
1-1/4	96	302
1-1/2	80/96	144/320
1-3/4	60	92
1-13/16	60	74
2	60/72	70/78
2-1/32	35/52	184/200
2-3/4	98	110
TYPE 304-L		
3/16	54	192
3/16	72/96	144/290
7/32	60/68	195/243
1/4	72	156
1/4	88/105	145/310
9/32	96/147	138/284
5/16	96	200
11/32	80/106	190
3/8	81/108	170/330
13/32	94	280
7/16	69/106	105/275
17/32	73/100	134/233
1/2	96/108	210/260
9/16	91	260
5/8	75/96	153/320

GAUGE	WIDTH	LENGTH
TYPE 304-L—CONTINUED		
11/16	96	264
23/32	98	126
3/4	60	172
13/16	94	230
27/32	67	248
7/8	96	278
15/16	75	270
31/32	62/92	168/191
1-1/8	96/98	165/198
1-1/4	96	240
1-1/2	96	240
2	80	205
TYPE 309		
3/16	48	120
3/16	73/91	105/320
1/4	41/60	112/120
1/4	96	205/220
3/8	96	240
1/2	77/96	155/280
5/8	96	192
11/16	57	82
3/4	28/49	96
1-5/8	68	72
TYPE 310		
3/16	48	120
3/16	72	104
1/4	72/95	200/240
5/16	63/82	185/240
11/32	96	125
1/2	99	260
2-1/4	25	48
TYPE 316		
3/16	54	192
3/16	66	198
3/16	72	192
3/16	82/96	170/280
7/32	66/93	110/300
1/4	94/105	160/320
5/16	96	240/300
11/32	86/97	120/240
3/8	86/111	225/300
7/16	78/96	170/360
1/2	96/106	230/300
9/16	74/96	205/290
5/8	96	285
11/16	96	183
3/4	96	280
13/16	77	140
7/8	96/102	236/370
15/16	98	188
31/32	96	276
1	98	242
1-1/8	98	244
1-1/4	65/96	240/260
1-1/2	67	226
2	40	60
2-1/2	70	100
TYPE 316-L		
3/16	72/90	150/170
7/32	93/110	118/120
1/4	72	156
1/4	72/108	156/300
5/16	70/96	240/295
11/32	92	210
3/8	72/96	200/250
7/16	76/96	122/240
1/2	96	200
17/32	100	135
9/16	96	303
5/8	96	240

GAUGE	WIDTH	LENGTH
TYPE 316-L—CONTINUED		
11/16	96	138
3/4	84	251
13/16	96	310
7/8	98	214
15/16	96	275
1	96	248
1-1/8	88/98	250/280
1-1/4	98	360
1-1/2	93	276
1-3/4	83	98
2-1/4	63	170
TYPE 317		
3/16	52	190
1/4	33/61	72/120
5/16	63/83	105/170
3/8	96	135
1/2	67	70
1-5/8	37	66
TYPE 317-L		
3/16	83/93	150/324
1/4	68/74	235/323
5/16	42	130/309
3/8	88/100	101/109
13/32	100	200
7/16	47	100
1-1/4	32	136
TYPE 321		
3/16	80	168
3/16	84/91	300/340
1/4	73/94	200/320
5/16	96	288
3/8	96	230
1/2	96	144
9/16	80	159
5/8	96	235
3/4	96	250
7/8	60/96	120/126
1	96	235
1-1/8	70	126
1-1/4	96	220
1-1/2	96	180
1-5/8	72	72
TYPE 347		
3/16	48	123
3/16	91	135
1/4	72/96	240/300
9/32	94	118
5/16	96	300
11/32	72/98	177/209
3/8	96	240/330
7/16	96	205
15/32	93	128
1/2	94	240
5/8	96	325
11/16	70/100	104/235
3/4	57	120
7/8	63/80	160/190
1	96/98	170/228
1-1/8	52	56
1-1/4	96	240
1-1/2	97	170
1-3/4	55	64
2-3/4	35	50
TYPE 405		
3/16	77/88	195/235
7/32	77	126
1/4	94	180
5/16	70/96	120/275
3/8	96	354
13/32	86	160

GAUGE	WIDTH	LENGTH
TYPE 405—CONTINUED		
7/16	60/94	245/255
1/2	61/96	110/174
9/16	97	140
5/8	96	304
3/4	83	167
7/8	96	254
15/16	69	135
1	99	145
1-1/8	97	148
1-1/4	96	208
1-3/8	38	223
1-1/2	84	145
TYPE 410		
3/16	72/91	190/295
1/4	73/100	275/290
5/16	95/96	173/365
11/32	97	160
3/8	94/98	130/278
7/16	74/96	139/310
1/2	73/98	200/275
19/32	92	350
5/8	96	180
21/32	96	375
3/4	96	199
13/16	104	120
7/8	96	149
1	33	196
1-1/4	98	189
1-5/16	55	170
1-1/2	68	176
1-3/4	60	62
TYPE 430		
3/16	86/90	190/290
7/32	72/96	115/295
1/4	86/97	200/300
9/32	62	240
5/16	96/99	240/310
3/8	96/97	175/300
7/16	75/98	290/305
1/2	96	210
9/16	87	240
5/8	60/93	120/130
3/4	82	375
7/8	77	260
29/32	97	204
1	98	206
1-1/8	96	220
1-1/4	96	180
1-1/2	96	180
2	48	95
2-9/32	70	119
TYPE 502-½ Mo (This grade available in plate only. Our base price is 28.25¢.)		
3/16	88/94	235/300
1/4	79/102	225/280
5/16	78/85	169/338
11/32	92	300
3/8	72/96	250/360
7/16	96	138
1/2	96	179
9/16	94	140
5/8	96	240
11/16	66	76
3/4	96	295
7/8	36	230
1	76	96
1-1/4	80	154
1-1/2	72	144

Mill Inventory of Stainless Steel Heads

A.S.M.E. FLANGED AND DISHED

(1½" to 2" straight flange—annealed and pickled after forming for maximum corrosion resistance)

O.D.	GAUGE	304	304-L	316	316-L	347
8-5/8"	3/16"	8	10	2	10	
10"	3/16"	2	18	12	12	3
12"	3/16"	16	6	8	6	
12"	1/4"	2	8	4	12	
14"	3/16"	2	4	10	5	
16"	3/16"	2	9	10	4	
16"	1/4"	5	7	10	5	
18"	3/16"	0	1	13	11	1
18"	1/4"	12	7	11	8	
18"	3/8"	3	2	4	2	
20"	3/16"	7	11	10	1	
24"	3/16"	14	14	4	5	11
24"	1/4"	19	11	8	8	34
24"	5/16"	6	2	18	6	
24"	3/8"	4	4	2	3	
30"	3/16"	22	10	1	0	
30"	1/4"	0	7	9	4	3

O.D.	GAUGE	304	304-L	316	316-L	347
36"	3/16"	7	8	0	2	
36"	1/4"	16	4	8	6	2
36"	5/16"	3	3	2	2	
36"	3/8"	5	2	3	2	
42"	3/16"	9	0	6	4	
42"	1/4"	2	6	8	8	
42"	5/16"	0	0	4	0	
48"	3/16"	2	7	12	7	
48"	1/4"	5	10	9	14	2
48"	5/16"	6	5	8	4	
48"	3/8"	5	6	0	1	
54"	3/16"	2	4	2	4	
54"	1/4"	6	3	1	5	
60"	3/16"	7	4	4	6	
60"	1/4"	2	8	9	2	
60"	5/16"	1	0	0	1	
60"	3/8"	7	3	5	2	

O.D.	GAUGE	304	304-L	316	316-L	347
66"	1/4"	6	6	3	3	
66"	5/16"	0	2	0	0	
72"	1/4"	6	5	6	1	
72"	5/16"	6	2	6	2	
84"	5/16"	0	0	0	2	

STANDARD FLANGED AND DISHED

18"	1/4"	2	4	2	4	
24"	3/16"	0	2	3	5	
24"	1/4"	5	1	8	2	
30"	3/16"	8	4	4	4	
30"	1/4"	5	4	2	2	
36"	3/16"	12	3	5	2	
36"	1/4"	6	3	6	3	
42"	3/16"	2	4	5	3	
48"	3/16"	2	4	6	4	
48"	1/4"	7	4	2	2	
54"	3/16"	2	4	2	4	

The stainless plates and heads listed above are typical of our current mill inventory; similar sizes are constantly being produced. Limited quantities of PH 15-7 Mo, 309 S, D 319 and D 319-L are on hand. Other grades—305, 309 SCb and 314—can be produced for specific orders. We will cut to your required sizes within 2 to 3 days, faster when required.

For latest information on exact quantities of stainless steel plates, tank heads and other available plate products, mail this coupon now.

G. O. CARLSON, INC. • 122 Marshalton Road, Thorndale, Pa.

Please send your Weekly Inventory Report to:

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Company_____

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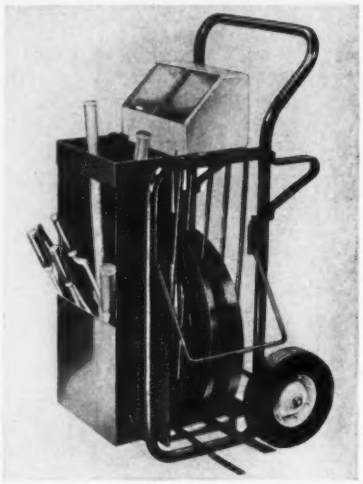
CAROLINA POWER & LIGHT COMPANY

NEW PRODUCTS and equipment



date various combinations of ¾, 1¼, or 2 in. wide steel strapping. The rods set at an angle to hold the strapping coils in position as they decrease in diameter.

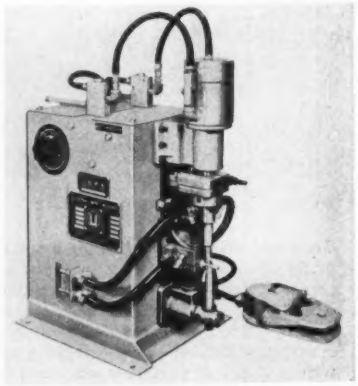
For further information, *write* Acme Steel Co., 135th Street and Perry Avenue, Chicago 27, Ill.

Bench Welder Handles Extrafine, Critical Work

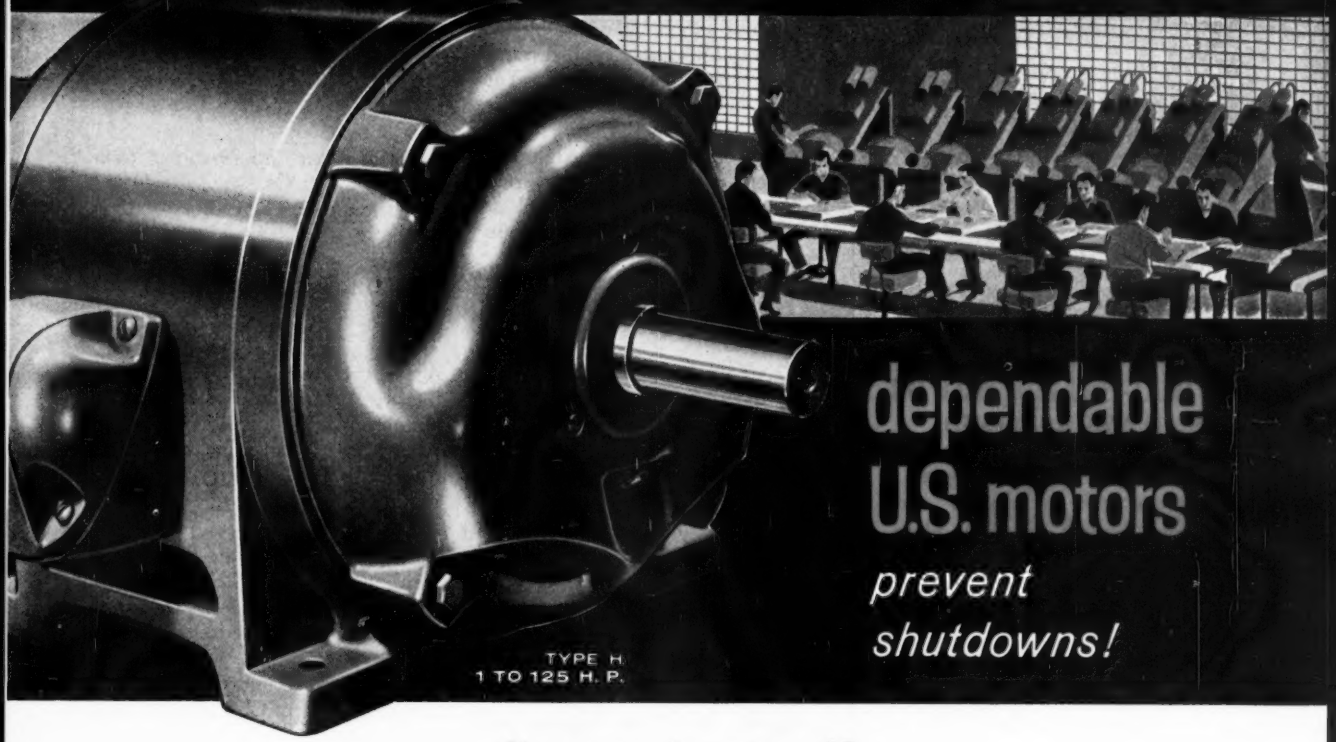
EXTRAFINE and critical welding can be done with the Universal Electroweld press type, bench welder. Capacities range from 5 to 50 kva.

All types of weldable metals can be joined to meet rigid specifications, says the company. The unit is air actuated, has adjustable upper and lower arms and holders, and comes equipped with a foot switch.

For further information, *write*



production shutdowns **cost more than motors!**

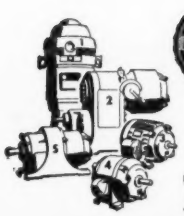


dependable U.S. motors *prevent shutdowns!*

...it pays to specify

U.S. Uniclosed Motors

Because production shutdowns *cost far more than motors,* real economy lies in buying motors of *quality* you can depend on! U.S. UNICLOSED is the motor choice for normal production needs. U.S. UNICLOSED MOTORS give you the quality and dependability that are built into every U.S. motor—plus protection *far* superior to ordinary dripproof motors. Only U.S. protects all windings with nature's non-organic, non-carbonizing insulation—asbestos! This prevents costly burn-outs. Unlike ordinary makes, U.S. motors have shock-resistant, corrosion-resistant cast iron frames that are *normalized*—heat-seasoned to prevent warp! To protect bearings, U.S. LUBRIFLUSH transverse lubrication purges old grease. This minimizes lubrication and maintenance requirements. These and many other factors add up to U.S. *quality*—the kind you can depend upon to keep production lines running! U.S. UNICLOSED 3-phase AC motors are available in RATINGS ¼ to 250 H.P. It pays to specify: "U.S. MOTORS."



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Stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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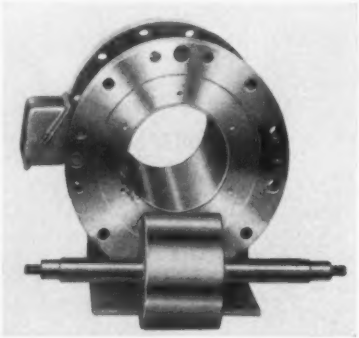
Universal Electroweld Div., Electric Arc Inc., 152-1 Jelliff Ave., Newark 8, N. J.

Stainless Pump Motor Handles Corrosive Liquids

HIGHLY corrosive or highly volatile liquids can be handled by the Peerless stainless steel canned pump motor. Size range: ½ to 5 hp. You can get bearings made of stainless, carbon block, glass, Teflon, sintered bronze, Teflon impregnated bronze or other materials. Stainless steel liners and covers are welded to form a seal over each welded surface.



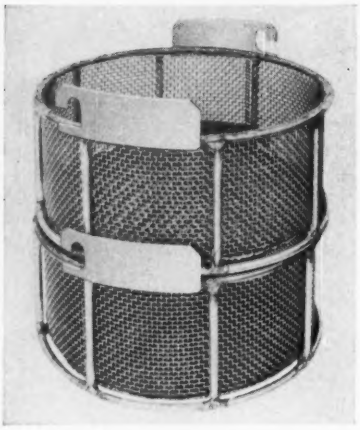
End brackets are attached with O-ring seals. Stators are completely sealed. Motors are supplied separately or with the pump attached.

For further information, *write* Peerless Electric Div., H. K. Porter Company Inc., 1500 W. Market St., Warren, Ohio.

Baskets Hold Parts For Washing, Annealing

A GENERAL purpose basket (12 x 28 in.) is completely arcwelded and suitable for partholding in washing, annealing, and storage cycles.

Each unit has two locking bars welded to the upper rim for support as grippers and stacking guides. Recommended stacking procedure includes a 29 x 40 in. Wiretex carrier made of ¼ in. stainless steel. The carrier can hold three baskets with loads up to 1800 lb.



For further information, *write* Wiretex Mfg. Co. Inc., 40 Mason St., Bridgeport, Conn.

Finishing Compound Cleans Aluminum Parts

A COMPOUND called Clepo 192-D has been formulated for cleaning aluminum. A tumbling finishing type, it can remove oil, dirt, aluminum dust, and grindings from aluminum nails, stampings, eyelets, and screw machine parts.

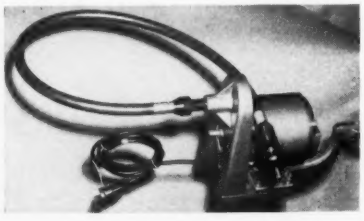
Surfaces produced are silvery, lustrous, and with sufficient lubricity to enable parts to slide freely during subsequent automatic feeding operations.

For further information, *write* Frederick Gumm Chemical Co. Inc., 538 Forest St., Kearny, N. J.

Flexible Shaft Machine Grinds, Polishes, Drills

A MULTISPEED flexible shaft machine has a 5 ft shaft (⅜ in.) with a neoprene rubber casing. The handpiece has high speed ball bearings and an arbor for attachments such as grinding wheels, wire brushes, chucks for drilling, sanding discs, and buffers.

You can get three speeds from



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Powered appliances for the homemaker lend willing help on many tasks—from sharpening knives to broiling chickens. And solid, ever-lustrous Superior Stainless lightens care for the life of each unit: *a wipe, and it's bright!* Superior Stainless Strip Steel is preferred by appliance manufacturers for dimensional accuracy; precisely as-specified composition, temper and finish; uniform ease of fabrication. • Let us have your requirements.

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OF

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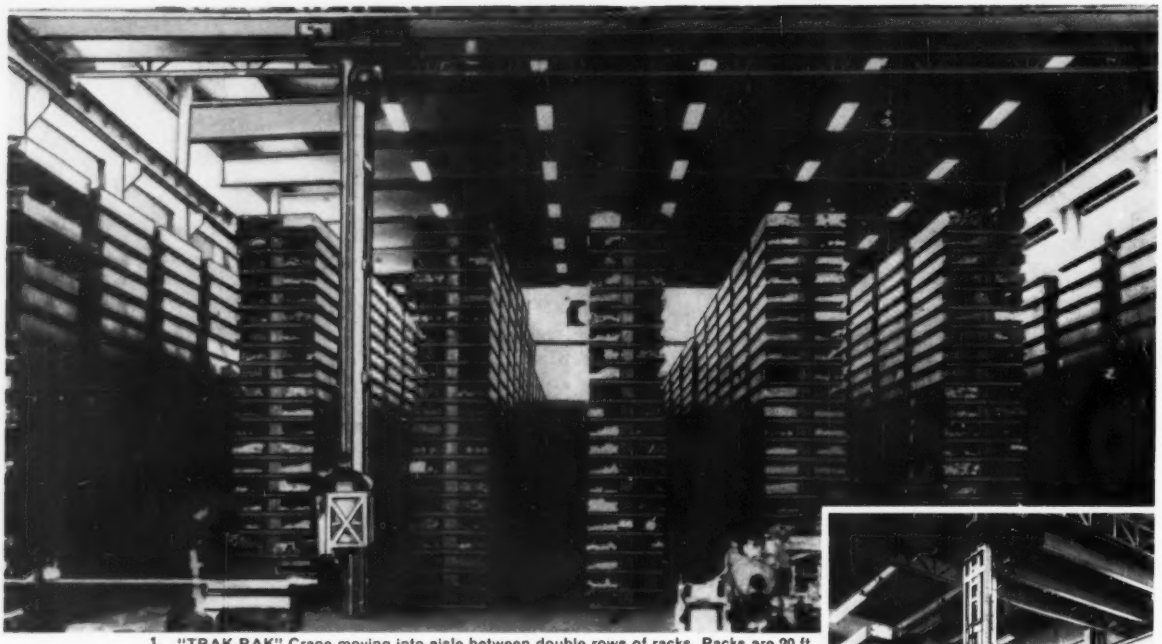
For Export: Copperweld Steel International Company, New York

Steel Warehouse Handles 3500 Stock Items with "TRAK-RAK" Crane

——— *Reduces Operating Costs... Speeds Service*



1. "TRAK-RAK" Crane moving into aisle between double rows of racks. Racks are 20 ft. high. Distance from floor to underside of roof truss is 30 ft. Aisle width is 5 ft.-4 in.

Edgcomb Steel of New England, Inc. warehouses 3500 different items of steel, stainless steel, brass, and aluminum bar stock in an area 60 feet wide, 27 feet high, and 160 feet long.

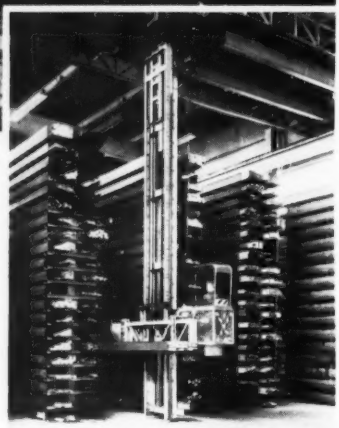
ONE man and a "TRAK-RAK" Crane serve the five double rows and two single rows of "Christmas Tree" racks which hold 2700 storage trays. Edgcomb processes approximately 2500 to 3000 orders per month, and the company reports very favorable reductions in operating costs and faster order processing and delivery.

Edgcomb's "TRAK-RAK" Crane has a traveling bridge (Photo 1) which spans the storage bay, and an overhead trolley from which is suspended an electrically operated rotating column equipped with a carriage for handling the storage trays. All operations of the crane and carriage, which rotates, moves toward or away from the racks, and raises or lowers on the column, are controlled by the operator who rides with the carriage. Safety switches prevent the column from running into a rack and permit full rotation only when the unit is safely beyond the end of the racks.

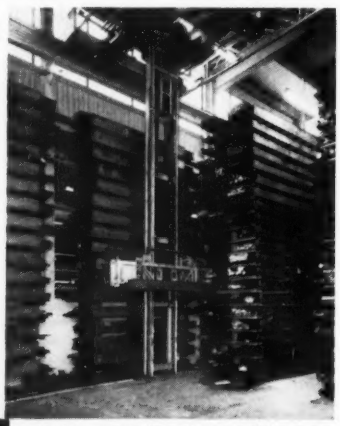
Hundreds of "TRAK-RAK" installations, designed to meet the user's particular requirements are in use today. They are handling many types of material and loads with great speed and economy. Specific advantages the "TRAK-RAK" System of vertical storage and handling brings to the user are:

1. **Maximum utilization of the cube to permit storing and handling more material in less floor area.**
2. **Faster material movement in and out of storage.**
3. **Reduction in personnel and lower labor costs.**
4. **Improved safety, better housekeeping, precise inventory control.**

Take the first step toward faster, more efficient material storage and handling now. Write for complete details on "TRAK-RAK." Chicago Tramrail Engineers are available to discuss your handling problem with you at any time—and at no obligation to you.



Crane with operator, who rides with carriage, emerging from aisle with loaded stock tray.



Picking up or depositing stock trays on the rack is a fast, safe operation. Trays and rack sections are color coded for quick location and identification.

CHICAGO TRAMRAIL CORPORATION

1326 SOUTH KOSTNER AVENUE • CHICAGO 23, ILLINOIS

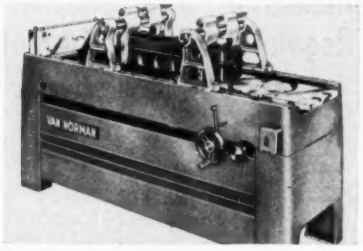
Specialists in the design, manufacture and installation of material handling systems for steel warehouses and other industries

the ¼ hp motor (1725, 3500, and 1000 rpm). Model number is VJ-38.

For further information, *write* Stow Mfg. Co., 63 Shear St., Binghamton, N. Y.

Automatic Rotary Broach Resurfaces in Three Steps

AN automatic rotary broach can resurface parts in three quick steps: 1. Work is set up on the loading table. 2. The micrometer upfeed control is set for required positive stock removal. 3. The automatic traverse feed is started. The machine shuts off at the end of the traverse.



A built-in loading table on the unit (Model 570) permits fast, top-side setups directly from machined work surfaces. Individual, replaceable carbide inserts can be sharpened with a special cutter lapping fixture.

For further information, *write* Van Norman Machine Co., a division of Van Norman Industries Inc., 3600 Main St., Springfield 7, Mass.

Cycloid Type Drive Smaller, Has High Torque

A COMPACT reduction drive based on the cycloid principle is 40 to 60 per cent smaller than other types with comparable ratings, says the manufacturer. Torque range is wide.

You can get a wide selection of ratios. Units are sealed in oil in a cast iron housing. The company says the drives are suited to integral design applications, especially where weight, space, or high torque

Whatever Your Field
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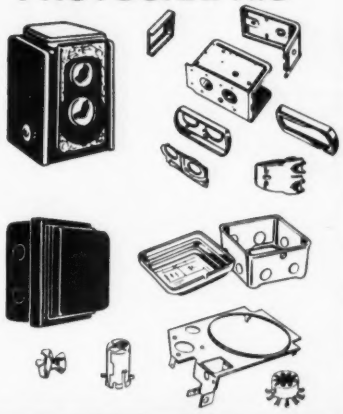
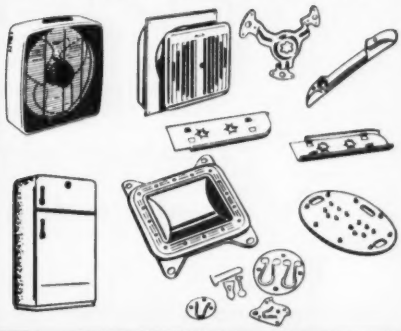


HEATING—COOLING



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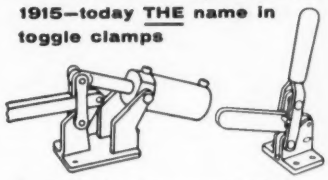
DE-STA-CO—stampings since 1915—today THE name in toggle clamps



De-Sta-Co has been recognized for over 25 years for its leadership in the field of production clamping devices. Today, our engineers are creating improved and special toggle clamps to meet *your* specialized production problems in every field. Over 130 models, types and sizes, stocking distributors everywhere. Send for catalog.

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Next time, check with De-Sta-Co for stampings, prices and *PLUSES*! Prints, samples or detailed letter will get you fast results. Qualified representatives from coast to coast. Write for the name of the De-Sta-Co man in your area.

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De-Sta-Co is widely known for toggle clamps, stampings, precision washers, spacers, shims, shim and feeler stock, blower housings and marine specialties.

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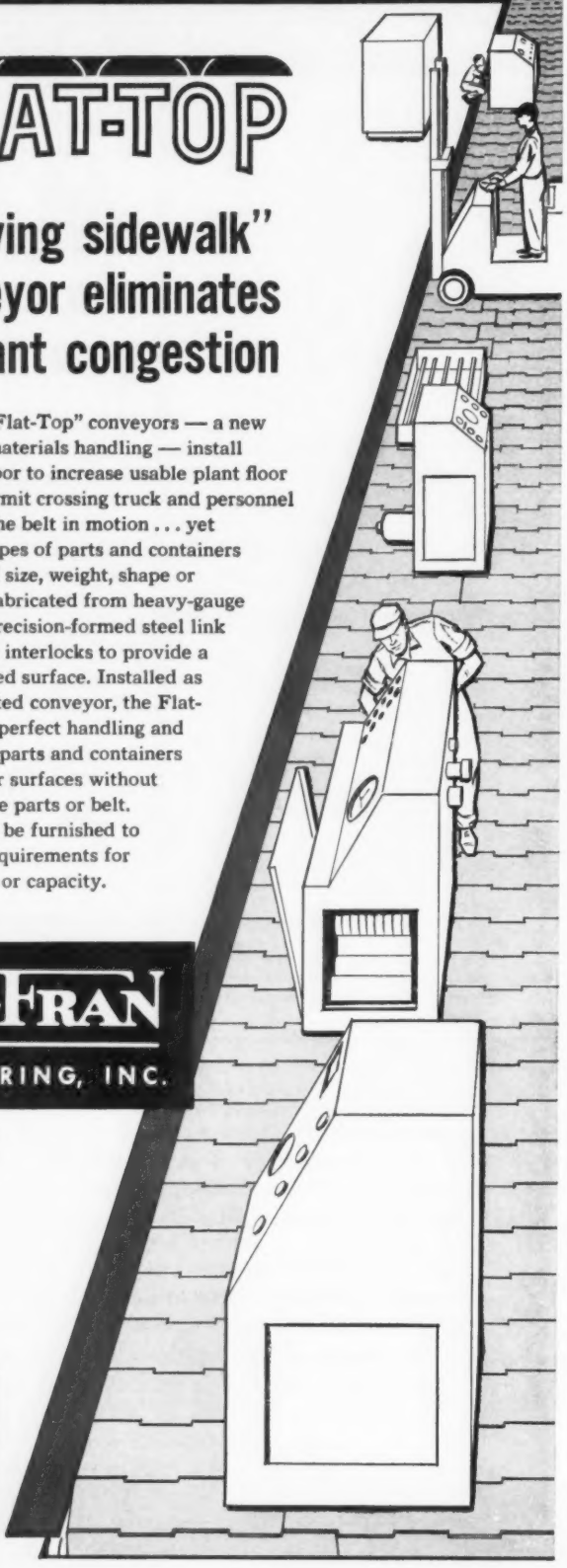
MAY-FRAN DOES IT AGAIN!

FLAT-TOP

"moving sidewalk" conveyor eliminates plant congestion

May-Fran "Flat-Top" conveyors — a new concept in materials handling — install flush-with-floor to increase usable plant floor space . . . permit crossing truck and personnel traffic with the belt in motion . . . yet handle all types of parts and containers regardless of size, weight, shape or condition! Fabricated from heavy-gauge steel, each precision-formed steel link overlaps and interlocks to provide a smooth, sealed surface. Installed as a floor-mounted conveyor, the Flat-Top permits perfect handling and deflection of parts and containers with irregular surfaces without damage to the parts or belt. Flat-Top can be furnished to meet your requirements for width, length or capacity.



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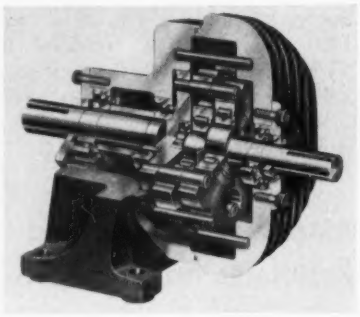
NEW PRODUCTS and equipment



is required. Sizes vary from small units for instruments to drives for large machine tools.

For further information, *write* Black Tool Inc., 1924 S. Navajo St., Denver 23, Colo.

Industrial Power Supplies Regulate Voltage, Current

VOLTAGE and current can be regulated by the Hevi-Duty ac or dc power supplies. The systems are adapted to customer specifications.

They can handle input to 15 kv (single phase or three phase, 25-60 cycles). Output ratings go up to 100,000 amperes (single phase, two phase, three phase, or direct current).

Suggested uses include: Electric furnace control, magnesium coating, limiting voltage, anodizing aluminum, and resistance heating of metals for forming.

For further information, *write* Hevi-Duty Electric Co., a division of Basic Products Corp., 2046 W. Wisconsin Ave., Milwaukee, Wis.

Close Coupled Motors Have Rerated Frame Sizes

A LINE of dripproof close coupled pump motors has NEMA rerated frame sizes from 182 through 405 U. Ratings are from ½ hp at 900 rpm through 75 hp at 1800 rpm. You can get explosionproof and totally enclosed fan cooled units from ½ hp (900 rpm) through 30 hp and in frames 182 through 326 U.

Diecast aluminum rotors have dual cooling fans and dynamically balanced rotor assemblies. Ball

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1. FABRICATION of all types of equipment (Fractionating Columns, Gas Columns, Pressure Vessels, Plate and Heavy Steel Work, Special Machines, Autoclaves, Shells, Bridge Girders) is performed to order, to specification.

2. MACHINING—Fully equipped, flexible facilities for machining to close tolerances, regardless of product size or design.

3. STAINLESS—Separate, integrated shop for stainless fabrication protects against contamination by ordinary steel.

4. DELIVERY by rail, truck or inland, coastal or overseas waterway.

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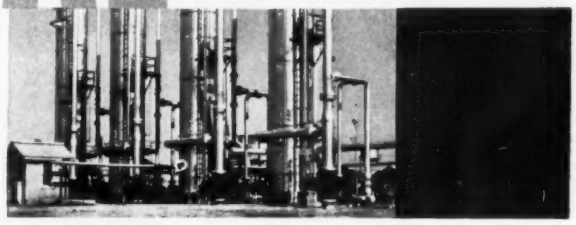
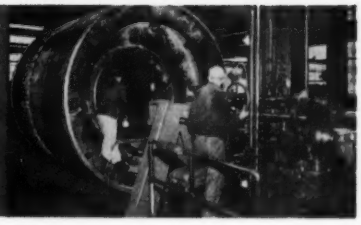
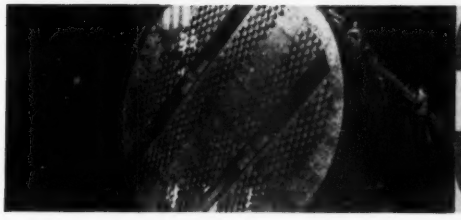


2 MACHINING





3 STAINLESS

4 DELIVERY

Through integrated, efficient operation, Sun Ship can reduce costs, increase your POTENTIAL. Call for an estimator or representative.

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ACHESON

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COLLOIDAL DISPERSIONS OF GRAPHITE, MOLYBDENUM DISULFIDE, AND OTHER SOLIDS

'dag' and 'Prodag' are trademarks registered in the U. S. Patent Office by Acheson Industries, Inc.

MUELLER BRASS SAVES $15,000 A YEAR ON FORGING LUBRICATION

Efficiencies realized by just one company — with the help of Acheson Dispersions — have already added up to this substantial savings. Uniform coverage, easy sprayability, and lasting lubrication effectiveness are providing this leading forgings producer: longer die life, increased production, fewer rejects, and improved forgings. This lubricating success story is being repeated throughout the metal working industry. Possibly *you* could profit from the use of an Acheson Dispersion.

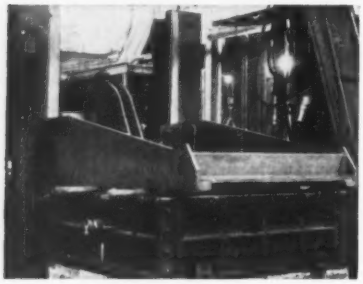
'Prodag' application on forging presses at Mueller Brass Company has saved between $15,000 and $17,000 annually for the past fifteen years. These impressive savings earned by this Port Huron, Michigan company — the world's largest producer of brass and bronze forgings — have been realized in many areas.

Previously, crank forging pressmen at Mueller swabbed the dies between each press stroke. Mueller designed their own spray apparatus, both manual and automatic, to lubricate lower and upper dies simultaneously. Time studies have shown that spraying has effected a five percent-per-pound economy over the swab method.

Spray application of 'Prodag' at Mueller Brass Company has resulted in impressive production savings.

Even more importantly, by using Acheson's 'Prodag' — a dispersion of graphite and water — diluted 1:35, Mueller has gained longer die life, reduced the percentage of scrap loss, and has obtained a better finish on their forgings. According to Mr. O. M. Hanton, Chief Forging Engineer for Mueller, "with 'Prodag' we get the right amount of lubricant on the die. Swabbing resulted in too much lubrication at one place or another in the die cavity, resulting in either a ruptured die or a defective part. Previously, every forging produced had to go to the grinding department. And grinding is one of the most expensive operations in a forge shop."

In producing deep-cavity forgings, or products which demand much smaller tolerances, Mueller uses 'dag' No. 3 — another of Acheson's graphite-water base dispersions. If you have a forging lubrication problem it will pay you to call in your Acheson Service Engineer or write for Bulletin No. 426.



'dag' 35, brush-applied to the slides of this rollover machine, increases machine life for this midwest foundry.

An expensive foundry problem was solved for the D. J. Murray Manufacturing Company, Wausau, Wisconsin, with the use of Acheson's 'dag' 35 — colloidal graphite in an alkyd resin solution. Slides on the huge rollover machine installed in their foundry division, previously lubricated by first a dry graphite and then rosin, were becoming deeply scored as a result of its 90-cycle-a-day operation in the handling of bench and floor molds.

The scoring and machine vibration was so severe that according to Maintenance Foreman, Ben Sayles, "we could see that the life of the machine was going to be very short if we continued this method of lubrication." Coating the slides daily with 'dag' 35, improved machine operation immediately. The scoring all but disappeared. After two years of application with this Acheson dispersion, no repairs have been necessary and none are foreseen. Since the entire production of their grey iron sand slinger line — some 60 tons of material in 8 hours — goes through this machine, the downtime avoided represents an important savings to the company.

For additional information, write for Acheson Bulletin No. 425. Address Dept. S-99.

ACHESON *Colloids Company*

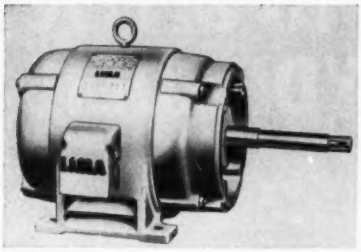
PORT HURON, MICHIGAN

A division of Acheson Industries, Inc.

Also Acheson Industries (Europe) Ltd. and affiliates, London, England

Offices in: Boston • Chicago • Cleveland • Dayton • Detroit • Los Angeles • Milwaukee New York • Philadelphia • Pittsburgh • Rochester • St. Louis

NEW PRODUCTS and equipment



bearings are prelubricated and sealed. The pump motors can be furnished in two or three phase versions and in all frequencies and in commercial voltages below 600.

For further information, *write* Dept. 149, Lima Electric Motor Co. Inc., Lima, Ohio.

Ultrasonic Generator Adjusts Automatically

ULTRASONIC generators produced by Industrial Ultrasonics Corp. require no tuning or monitoring. The units automatically measure the ultrasonic activity in the cleaning tank and vary the output frequency of the generator to produce maximum cavitation.

The generators are said to automatically operate at peak efficiency even as the load varies. Several models are available.

For further information, *write* Industrial Ultrasonics Corp., 827 Harrison Ave., Kearny, N. J.

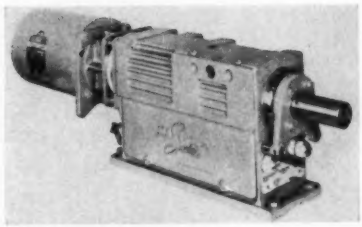
Production Instrument Checks Small Part Size

ACCURATE spotchecks of small part dimensions during production runs can be made with the RCA limit signaling comparator. It's also suitable for inspecting parts as they are received from suppliers or for postprocess gaging.

The instrument operates on radio frequency and gives quick response. Operator readings are shown by lights (high, low, or acceptable limit) on a meter panel. The unit measures 14½ x 9¼ x 8⅛ in. and operates on 110 volts.

For further information, *write* Radio Corp. of America, 30 Rockefeller Plaza, New York 20, N. Y.

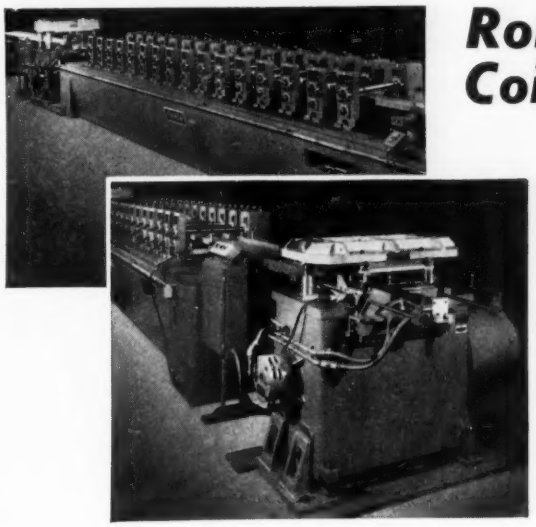
Automatic Drill Unit Has Fewer Moving Parts



AN AUTOMATIC drill unit is designed for use with Hartford standard building block components in automatic drilling and tapping machines. The company says it has fewer moving parts and greater operating dependability.

The unit (Model 17-400) has air-hydraulic operation with a fast, positive adjustment for rapid advance, feed length, feed rate, and total length of stroke. An optional provision can be made for back feed with independently adjustable rate, and

(*Please turn to Page* 178)



Roll Form Coil Stock

•

BY THE MILE

Fully coordinated roll forming production lines, such as the above Ardcor installation, produce finished products on a miles-per-day basis.

Here an embossed, aluminum section of .019" stock is being formed by a leading aluminum manufacturer at a rate of 200 ft. per min. An Ardcor Prenotch Press, lower photo, and an Ardcor Cut-Off Press, upper left top photo, complement the high performance of the popular Ardcor 1-F Roll Forming Machine.

Ardcor can furnish complete roll forming lines for a wide variety of shapes and sizes—to customer specification.

Let us evaluate the greater production possibilities of your products. Write us.

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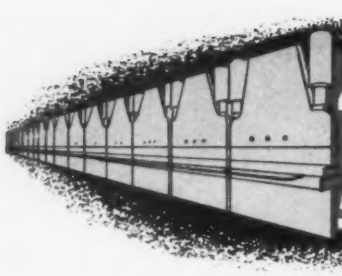


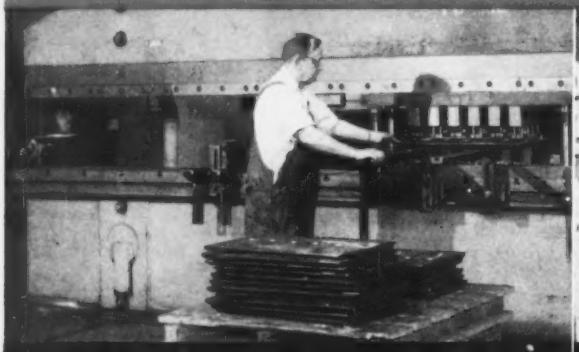
4,769 years to arrive ACCURATE HYDRAULIC

122 out of 124 hydraulic press brakes in U.S. aircraft industry are PACIFIC

Aircraft manufacturers work to the closest tolerances of all industries in metal forming. Douglas Aircraft Company, Tulsa, Oklahoma, with 8 Pacific Brakes (above) is typical of the airframe manufacturers who have selected Pacific for its precise accuracy.

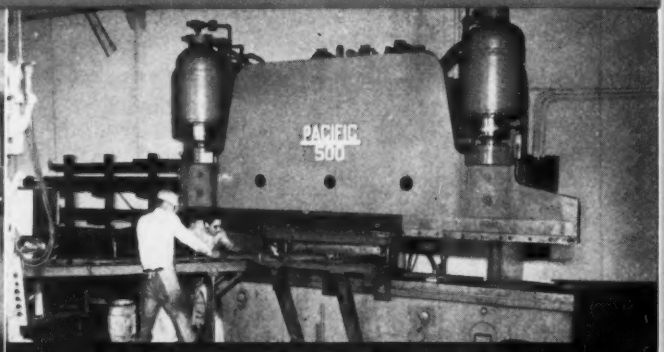
924 PACIFIC Brakes, representing over 95% of all hydraulic press brakes in use today, have operated for an aggregate of 4,769 years to test and confirm PACIFIC designs that have established hydraulic press brakes as far more profitable to operate than mechanical brakes. However, only PACIFIC has precise accuracy, versatility, high speed and dependability that comes from years of experience in manufacturing, developing and improving this unique machine. It is the only hydraulic press brake in daily operation that is actually air bending, straightening, deep drawing, blanking, and doing heavy punching. Accuracy within thousandths of an inch (greater than with any mechanical or other hydraulic brake) repeats itself on every stroke. Ram remains level regardless of location of work on the bed. PACIFIC sizes range from 60 tons to 1500 tons.

PACIFIC HYDRAULIC



Only hydraulic brake built for HEAVY PUNCHING

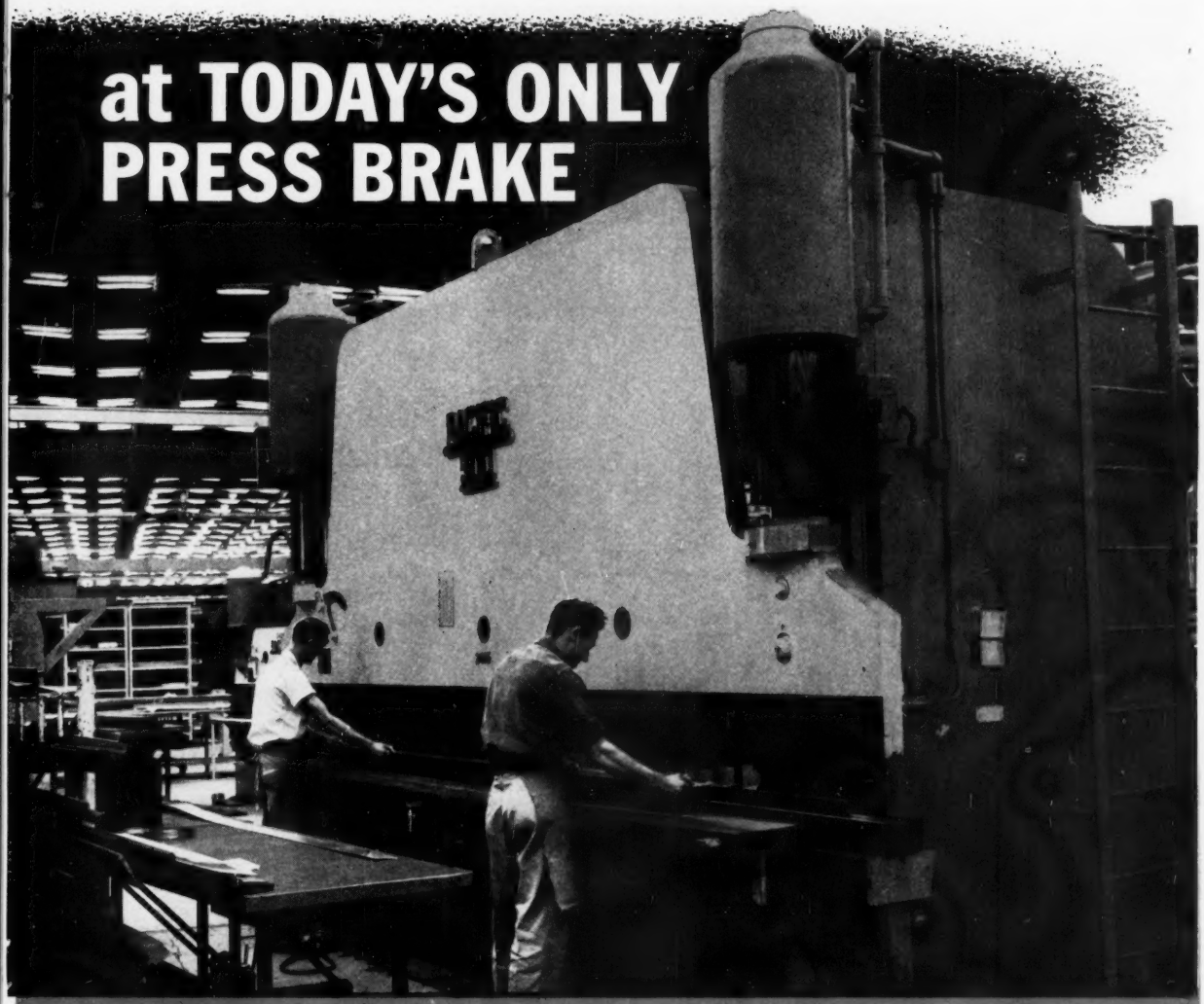
Pacific is uniquely designed to absorb heavy shock from punching in the hydraulic system rather than in the frame of the brake. Cushioned against shock, punch and dies stand up from 3 to 8 times longer than with mechanical brakes. Photo (above) shows 1" alloy steel plate being punched at earthmoving equipment plant.



MAINTENANCE-FREE for years

Dependable, simplified electrical and hydraulic controls can easily be kept working continuously by any plant maintenance crew. There are no complicated electronic devices. In photo (above) at agricultural equipment plant, the 500 ton Pacific Hydraulic Brake shearing ¾" alloy steel plate with Pacific Shearing Attachment has operated continuously for the first 4 years at a cost of $5.22 in replacement parts.

at TODAY'S ONLY PRESS BRAKE



PRESS BRAKE

HIGH SPEED operation

Pacific adjustable stroke length can be shortened for rapid stroking. Automatic, self-leveling ram permits use of progressive dies across entire bed of press. The automatically-fed Pacific at automotive parts plant, which can cycle up to seventy 1½" strokes per minute, is forming 3780 operations per hour in the above photo. In virtually any operation, Pacific's high cycling speed equals or exceeds materials handling capacity.

Write for brochure

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takes tough twists without
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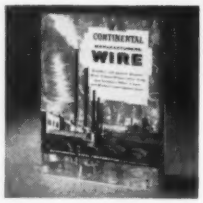

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CORPORATION—KOKOMO, INDIANA

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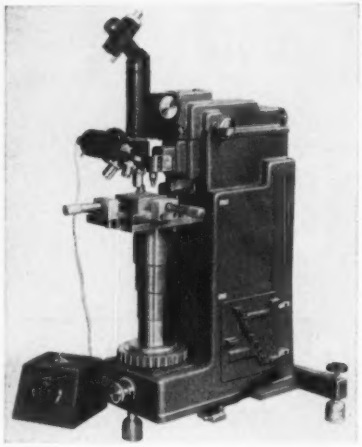
NEW PRODUCTS and equipment

(*Concluded from Page* 175)
for skip drilling and dwell control. Direct, pulley gear, or pulley driven gear drives can be supplied. Spindle motors from 1/3 to 5 hp are available with torque capacity up to 500 in.-lb.

For further information, *write* Hartford Special Machinery Co., 298 Homestead Ave., Hartford 12, Conn.

Microhardness Tester Has Vertical Capacity of 8 in.

A MICROHARDNESS tester (Model AK-8) has a vertical capacity of 8 in. and applies dead weight loads of 1 to 1000 grams. Additional weights for applying loads up to 10,000 grams are optional equipment.



The production control instrument is designed to test unmounted parts and products like sheet metal and wire.

For further information, *write* Torsion Balance Co., 35 Monhegan, Clifton, N. J.

Abrasive Cutoff Saw Slices Beams, Pipe, Bars

FOUR sizes of cutoff wheels are available on the Wallace modular "cut-machining" units: 16, 18, 20, and 36 in. diameters.

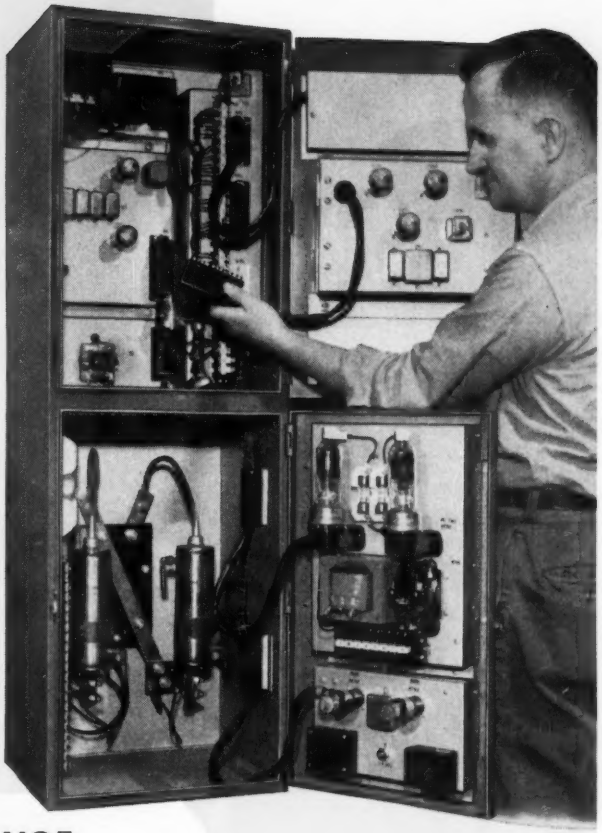
The unit can cut a wide flange beam up to 8 x 8 in. (69 lb per ft). It can also handle such sections as 8 in. extra heavy pipe and 5 in.

This New **PLUG-IN** Welder Control

Lets You

ADD CONTROL FUNCTIONS AS YOU NEED THEM

A Wide Range of Plug-In Units Enables You to Add Components as Your Welding Jobs Change



HERE'S HOW YOU CHANGE YOUR BASIC CONTROL SIMPLY BY ADDING PLUG-IN UNITS

FOR WELDING MILD STEEL— BASIC CONTROL INCLUDES THESE PLUG-IN UNITS:

3B Timer
Relay Valve Control
Tube Firing Panel

FOR WELDING ALUMINUM— YOU ALREADY HAVE:

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YOU ADD THESE PLUG-IN UNITS:

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Every feature you want —for every welding job

- 22 standard units provide "custom" control for every welding requirement
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Write for Bulletin SM-277 to Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin

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technology determines your engineering sales . . .

Let's not emphasize the size of the $140 billion metalworking market. Rather, let's think about *your* product. Let's remember that its inherent purpose — *its engineering advantages and applications* — is most often its basic appeal to metalworking. So isn't it obvious that technical management (technology) must pass upon these engineering features somewhere early in the buying process?

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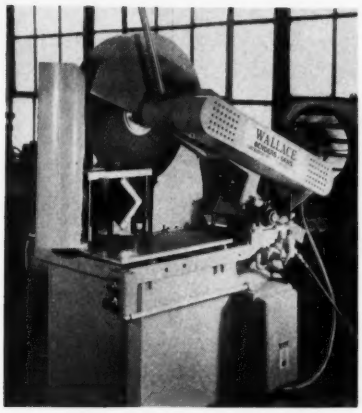

round or 4 in. square solid bars.

For further information, *write* Wallace Supplies Mfg. Co., 1304 Diversey Parkway, Chicago 14, Ill.

Coolant Improves Medium Duty Cutting, Grinding

GREATER production economies in medium duty cutting and grinding are claimed for a coolant designated H-114. The oil has a sulfur chlorinated base with fatty E. P. characteristics and can produce fine finishes. It has good body, chip settling properties, and low carryoff.

In fine finish grinding, wheel loadup is prevented. Wheels stay free cutting and require less dressing.

For further information, *write* Shear - Speed Chemical Products Div., Michigan Tool Co., 7125 E. McNichols Rd., Detroit 12, Mich.

Dripproof Motors Resist Heat, Dirty Atmospheres

THE Sterlicone Multi-Shielded motors are standard dripproof types designed for adverse conditions. Examples are continuous and excessive moisture, high humidity and temperature, salt spray, dust, oil, and chemically contaminated atmospheres that previously required totally enclosed, fan cooled protection.

Flexible insulation is provided by multiple application and controlled processing of a silicone sealing com-

(*Please turn to Page* 184)

MACHINES ON THE MOVE...

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FAIRFIELD GEARS

GEARS to match the speed, size, and power of modern machines are a Fairfield specialty. This is possible because Fairfield is a leader in utilizing the most advanced methods, machines, and techniques for producing better gears. By specializing exclusively in "Fine Gears Made to Order", Fairfield has become one of America's largest independent producers of these parts.

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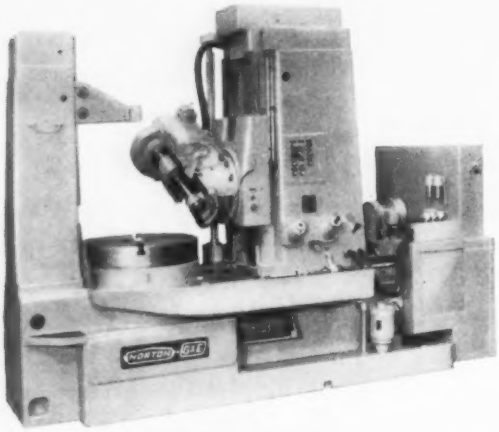
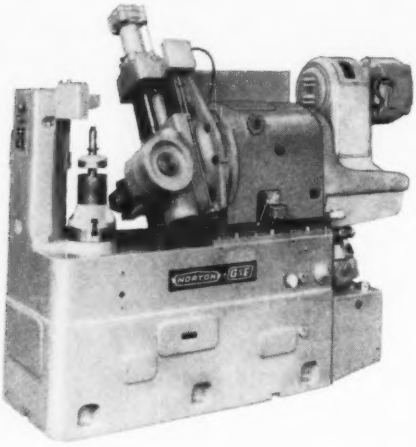
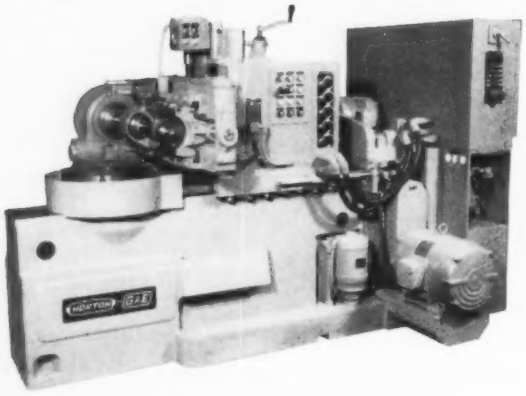
G & E Universal Gear Hobbers are available for commercial and precision production of spur and helical gears, up to 160" diameter.



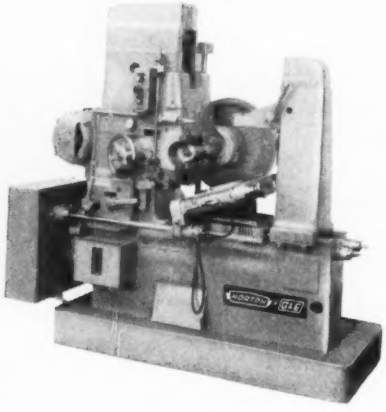
G & E 10HQ HOBLIQUE* Universal Gear Hobber is designed for high speed, high production hobbing of spur and helical gears up to 10" diameter.



Norton Welcomes G&E

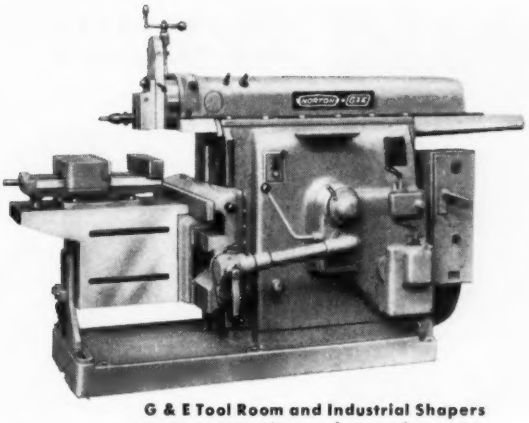


G & E Worm Gear Hobbers are long established leaders for fly tooling or hobbing commercial and precision worm gears up to 100" in diameter.



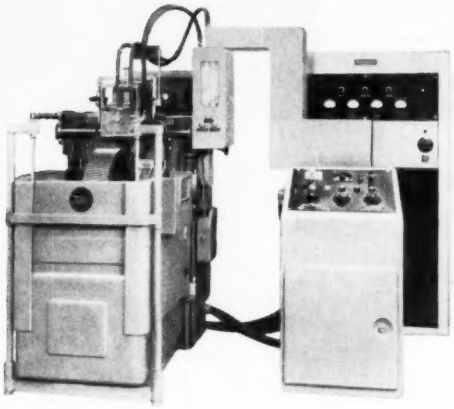
G & E Gear and Rack Cutting Equipment for automatically cutting a diversified range of spur and bevel gears, sprockets and racks.

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



G & E Tool Room and Industrial Shapers meet every requirement for speed, accuracy and compactness on general work. Available in seven sizes from 14" to 36" stroke. Can be equipped with an hydraulic follower attachment.

G & E Delapena COLD HEAT* Gear-Tooth Induction Hardener employs a revolutionary new process for hardening gear tooth profiles. A patented intensifier operating under water, consistently produces a uniform hardness pattern, and reduces distortion to an absolute minimum.



. . . famous shapers and gear cutting machines join fast growing machine tool family

The addition of the Gould and Eberhardt Division expands capacity and adds a variety of products to the Norton line to serve you better in the Machine Tool field.

The G & E machines shown here are popular leaders in the broad line that will continue in its entirety. Transferal of the manufacture of these machines to Norton headquarters is accompanied by the technical know-how that has made G & E a long established, highly valued supply source of metal cutting equipment.

At Worcester, production of G & E machines is assured the top quality standards that have made Norton the world's largest supplier of grinding machines and lappers.

Norton will be glad to help you select the G & E equipment you need for the results you want. For further information or for G & E parts, write NORTON COMPANY, Gould & Eberhardt Division, Worcester 6, Massachusetts.

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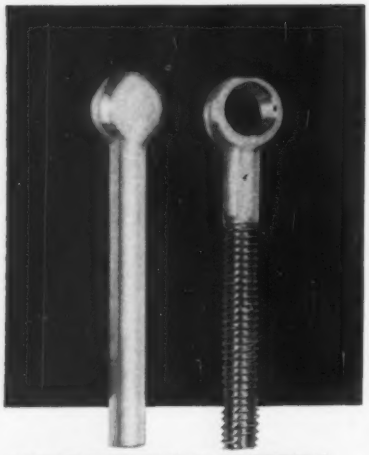
Making better products
. . . to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners



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- ***Fast Shipment***

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*Head diameter of rod end is nominally two times the diameter of the shank. When requesting quotation, please indicate hole size and thread length.

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STAINLESS STUDS – Full threaded, tap end, double end–fabricated promptly.

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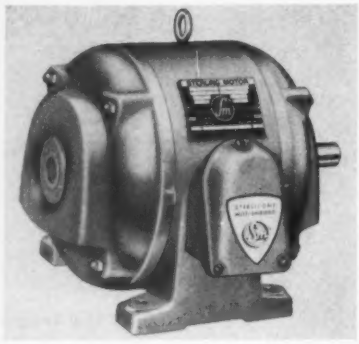
NEW PRODUCTS and equipment



(*Concluded from Page* 181)

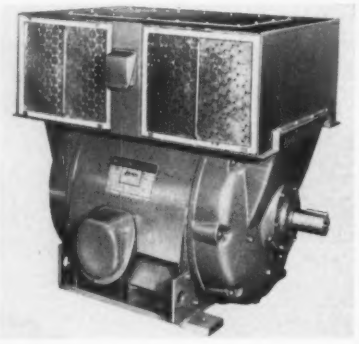
pound. The insulation is thin, nonporous, and resilient.

Ratings from ½ to 50 hp are available with phase, frequency, and voltage to be specified.

For further information, *write* Sterling Electric Motors Inc., 5401 Telegraph Rd., Los Angeles 22, Calif.

Press Drive Motors Have 1 to 300 hp

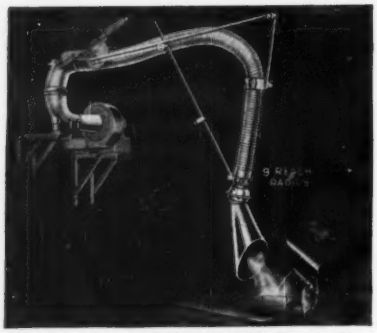
PRESS DRIVE motors (1 to 300 hp) are designed for metal cutting and forming machines. They have high slip, high starting torque, and low starting current and are recommended for dirty atmospheres, including those with oil, moisture, or chemical concentrations.



You can get dripproof, totally enclosed, fan cooled, explosionproof, and forced ventilated motors in frames sizes 182 to 8120. The photo shows a forced ventilated, totally enclosed motor.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Remove Welding Fumes at the Source... with RUEMELIN FUME COLLECTOR



Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated AT THEIR SOURCE. Improves working conditions . . . lessens fatigue . . . paves the way for increased plant production. Especially helpful in winter months when windows and doors are closed.

Note the new spring-loaded counterbalance mechanism which makes Fume Collectors much easier to handle.

WRITE FOR DETAILED INFORMATION

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to clean better, rustproof the metal, eliminate odors, skin irritations, the dangers of fire.

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to protect cast iron and other ferrous metals against rust for long or short periods of time.

Cleaning
to quickly clean oil, grease, soil and dirt from any metal surface from small parts to heavy machinery.

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to leave a protective rustproof surface as it cleans, so minute it cannot be seen or felt.

Magnetic Inspection
to replace kerosene or mineral spirits and safely reduce costs, speed production, improve definition.

Tumbling
to shorten the cycle, insure cleaner, rustproofed work.

Degreasing
to reduce costs, improve results, eliminate dermatitis and other hazards.

Solvent Replacement
to remove cutting oils from machined parts, at lower costs, without hazards.

Hydrostatic Testing
to give water clear, rustproof solutions.

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to prevent rusting of tank and metals quenched.

Rustproofing Internal Systems
one part to 2500 parts plain water, prevents rusting.

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REG. U.S. PAT. OFF.

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There are a variety of IMMUNOLS for all types of metals and all types of metalworking operations. These widely used solvents—endorsed by insurance companies—eliminate the fire hazard, are inexpensive and odorless. They are mixed with water for:

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a 1:50 mixture gives cooler work, better tool life, better finishes, additional rust protection.

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to insure swift and complete removal in cleaning.

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to remove all surface residues in preparation for plating and as an additive to final rinses.

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to aid in heat convection and release stone dust.

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to increase penetration, lower surface tension, insure cooler work, better finishes.

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to facilitate cutting and grinding operations by dispersing and sinking metallic silt particles.

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to increase the convection property of plain water used for cooling, frictional heat or quenching.

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to insure faster penetration of liquids.

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after anodizing to produce a mirror-like finish, seal the pores of the metal and make it more resistant to contamination.

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An easy, half-turn flip for Roto-Pin releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Roto-Pin makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking.

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NEW literature

Write directly to the company for a copy

Induction Heating

Developments in hardening, brazing, soldering, forging, and annealing by Ther-Monic induction heating equipment are discussed in a 52 page catalog-handbook. Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.

Hydraulic Systems

Bulletin 10051-H, 16 pages, includes specifications and illustrations, on the complete line of standard Oilgear and Servocontrol equipment. Oilgear Co., 1571T W. Pierce St., Milwaukee 4, Wis.

Small Tubing Analysis

Special Analysis Memo No. 121 gives general information and discusses present and potential applications for columbium, tantalum, and vanadium. Superior Tube Co., 1585 Germantown Ave., Norristown, Pa.

Fire Extinguishing Systems

Folio 1-1 lists principal causes of large loss fires, advantages in the use of carbon dioxide, and examples of extinguishing installations in various industries. Cardox Div., Chemetron Corp., 840 N. Michigan Ave., Chicago 11, Ill.

Guide to Better Welding

Technology, economics, and other practical aspects of multiarc welding are treated comprehensively in a 71 page booklet. J. B. Nottingham & Co. Inc., 441 Lexington Ave., New York 17, N. Y.

Carbon Steel Bars

A bulletin discusses stock sizes and shapes of more than 20 kinds of cold finished carbon steel bars, along with comparative data on strength, workability, machinability, heat treatment response, and cost. Joseph T. Ryerson & Son Inc., Box 8000-A, Chicago 80, Ill.

High Strength Steel

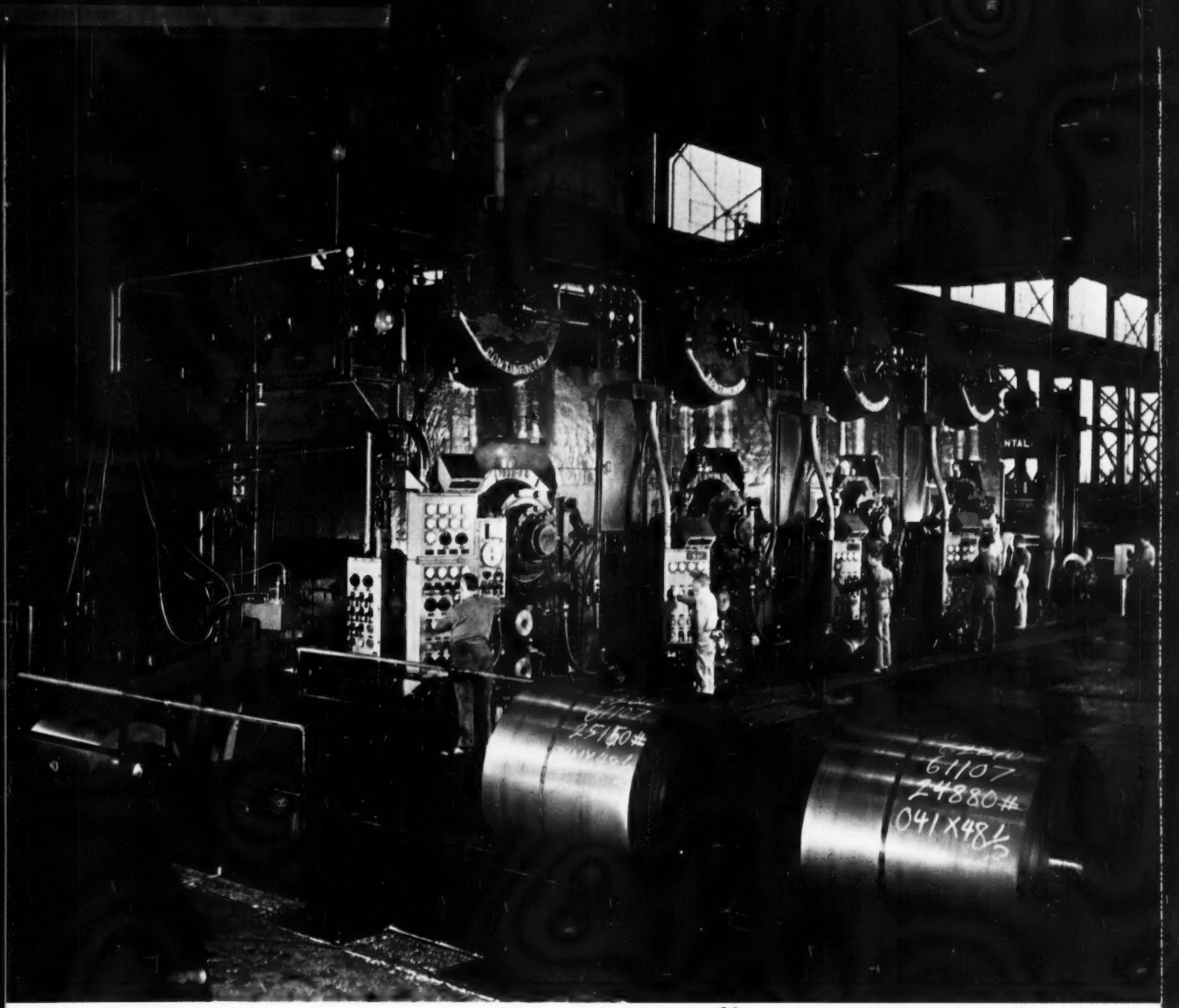
A technical bulletin covers engineering and maintenance applications of a prehardened, machinable, high strength steel: Viscount 44. Latrobe Steel Co., Latrobe, Pa.

Hoist Specs

"HMA-200 Standard Specifications for Hand Chain Hoists," 8 pages, contains tables and recommended minimum standards on differential, worm-geared and spur-geared (or equivalent) types of hand chain hoists, hook or lug suspension, and plain or geared trolley. Hoist Manufacturers Association Inc., 1 Thomas Circle, Washington 5, D. C.

Studwelding Fasteners

A booklet details standard designs and specifications for studwelding fasteners. K S M Products Inc., Merchantville, N. J.



60-inch, 4-stand tandem cold mill

BLAW-KNOX
COLD STRIP MILLS

Blaw-Knox designs and builds all types of cold reduction and temper mills for ferrous and non-ferrous work. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations including all auxiliary equipment for ferrous and non-ferrous metals, iron, alloy iron and steel rolls, Medart cold finishing equipment, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings.

BLAW-KNOX

BLAW-KNOX COMPANY

Foundry and Mill Machinery Division
Blaw-Knox Building • 300 Sixth Avenue
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WORKABILITY

Constant laboratory control by analysis, tests and inspection confer many advantages upon Acme-Newport electrical sheets. They are unfailingly true to gage. They punch cleanly, without burrs or breaks; and assemble smoothly and easily. The resultant savings in manufacture are obvious.

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Acme-Newport Steel COMPANY

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PRODUCTS OF
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Hot Rolled Steel in Coil
Hot Rolled Pickled Steel in Coil
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Cold Rolled Steel in Coil (*full hard only*)
Cold Rolled Sheets
Alloy Sheets and Plates
Plates ($\frac{5}{16}$" *and lighter*)
Electrical Sheets
Electric Weld Line Pipe
Spiral Welded Pipe

Mills Shipping at 90% of Capacity

STEEL inventories have bottomed out and are on the way up again.

Mill shipments will exceed consumption by about 2 million tons this month, with the surplus going into users' stocks. Producers will ship at 90 per cent of capacity (equivalent to 8.5 million tons), but users will consume at no more than a 70 per cent rate (6.5 million). Reason: They can't run at full speed until they've balanced their inventories and accumulated enough steel for uninterrupted operations. Lack of vital parts is restricting consumption in the automotive, construction, railroad carbuilding, and farm equipment industries.

At the beginning of the month, inventories were estimated at 8 million tons—the lowest level since 1946 and less than one-third of the prestrike size (26 million). Today, they're about 8.5 million. By Dec. 31, they'll hit 10 million.

FIRST QUARTER OUTLOOK—Barring resumption of the strike, consumers will chew up more steel in the first quarter of 1960 than they ever have in a corresponding period. Market analysts of a leading steel company are guessing 20.5 million tons (vs. 18 million in the first quarter this year). Consumption may even reach 21 million if auto industry forecasts are accurate. Automakers are said to be planning record first quarter production of 2.24 million cars—120,000 more than they assembled in the January-March quarter of 1955. Even if they consume a record tonnage, users will up their inventories by at least 5 million tons during the first quarter.

OPERATION CLEANUP—Now that they're hitting full stride, sheet producers hope to clean up all their third quarter orders by mid-February. Fourth quarter tonnage "doesn't exist," they say, because market conditions necessitate rescheduling, changing specifications, and distributing tonnage on the basis of past buying patterns. Almost all users will get some steel before the injunction expires, but it's a safe bet that none will get as much as he wants. Customers seem reasonably satisfied that the mills are doing their best and that they're being given a fair shake.

PRODUCT BY PRODUCT—In the East, carbon bar suppliers estimate that they'll be able to clean up orders placed prior to the strike by early January. Although most steelmakers are sold out of sheared plates for the first quarter, those that produce only plates and plate specialties can still accept some tonnage for early March delivery. At Pittsburgh, wire producers say they won't complete orders that were placed during the strike until the end of January. A leading tin plate producer expects to ship all tonnage that was originally scheduled for the third quarter by Mar. 1.

QUALITY LACKING?— Although steelmakers are pouring ingots at a high rate and rolling on almost normal schedules, they haven't returned to prestrike quality levels on annealing and pickling lines in many cases, customers complain. Case in point: A bar stock supplier to the auto industry says he's having to send the steel out for extra annealing after it arrives from the mill.

PRODUCTION BREAKS 90— Last week, steelmaking operations edged up to 92.5 per cent of capacity, 2.8 points above the previous week's revised rate. Production was about 2,619,000 ingot tons—largest since the week of June 15.

WHERE TO FIND MARKETS & PRICES

	News	Prices
Bars, Merchant	194	201
Reinforcing	217	202
Boiler Tubes	...	204
Canada	197	*
Clad Steel	...	205
Coke	...	207
Coal Chemicals	...	207
Charts:		
Finished Steel	...	199
Ingot Rate	198	...
Scrap Prices	...	211
Comparisons	...	199
Contracts Placed	198	...
Contracts Pend.	198	...
Electrodes	...	207
Fasteners	...	204
Ferroalloys	...	208
Fluorspar	...	207
Footnotes	...	204
Imported Steel	193	207
Ingot Rates	198	...
Metal Powder	...	207
Nonferrous Met.	214	216
Ores	...	207
Pig Iron	211	206
Piling	...	201
Plates	193	201
Plating Material	...	217
Prestressed		
Strand	...	*
Price Indexes	...	199
Producers' Key	202	...
R.R. Materials	197	204
Refractories	...	207
Scrap	210	212
Semifinished	197	201
Service Centers	195	206
Sheets	193	202
Silicon Steel	...	203
Stainless Steel	...	205
Strip	193	203
Structurals	197	201
Tin Mill Prod.	194	203
Tool Steel	...	205
Tubular Goods	192	205
Wire	195	203

*Current prices were published in the Nov. 30 issue and will appear in subsequent issues.

How CLAD-REX® can simplify production methods and reduce costs

Clad-Rex is a vinyl-metal laminate. Specifically, a calendered, semi-rigid poly-vinyl chloride film bonded to sheet metal. It is obviously a material that will give your product the almost unlimited color, style and texture of printed film *plus* the strength of steel or the weight advantage of aluminum. All alloys and tempers of aluminum and steel (including galvanized and aluminized) are commonly used. Other metals can also be used where their special properties are important to end product performance.

However, not so obvious is the practical nature of Clad-Rex. It combines finish and sheet metal into one material that can be fabricated in almost as many ways as *un*finished sheet metal. The result is an unusual opportunity for you to simplify and reduce the cost of normal manufacturing procedures. These savings in time, labor, equipment, factory floor space, rejects, etc. are worthy of close examination.

Here's why . . .

Clad-Rex is pre-finished

Unlike *un*finished sheet metals, Clad-Rex is finished when you get it. Unlike other pre-finished metals, Clad-Rex offers unusual resistance to abrasion. Normal fabricating procedures and shop handling do not damage the vinyl surface of Clad-Rex. In most cases, existing tooling can be used without change—even for deep drawing.

Unfinished metal—complex methods

The inherent ability of Clad-Rex vinyl-metal laminates to simplify production procedures and sharply reduce manufacturing costs can best be described by a comparison.

Consider, for example, a cabinet for television—Using *un*finished sheet metal, the cabinet begins in forming and drawing. Next, cleaning to remove drawing compounds, etc. then, grinding and/or polishing. Now the various attachments and supports for the television and chassis are welded in position.

The next phase is preparation for finishing. This includes several steps of cleaning and surface preparation—often special treating, such as bonderizing against corrosion.

Finally, finishing begins with prime coating. Often multiple finish coats. Then, baking. Through this sequence is inspection and re-inspection all along the way.

Now comes assembly, and more inspection. A slip of a screw driver here, or an abrasion in handling produces a reject. A reject means a complicated reverse process to disassemble, strip the paint, re-buffing and then back through the finishing line all over again.

Clad-Rex—simple, less cost

Now consider the same television cabinet. Only this time made of Clad-Rex vinyl-metal laminate—

Clad-Rex comes out of the forming dies, through inspection and directly to assembly. No buffing to remove die marks . . . no finishing of any type . . . usually no rejects during assembly either.

The time, labor, equipment, floor space, etc., required are much less. All represent a substantial savings when you use Clad-Rex vinyl-metal laminate *instead of unfinished sheet metal*. That's why, although Clad-Rex costs more going into your plant, your product made of Clad-Rex can cost less when you ship it.

A source of engineering service

Clad-Rex interest in helping you extends into your own plant. A Clad-Rex Fabricating Engineer is available to show your production people how easy it is to process Clad-Rex. Furthermore, Clad-Rex operates a fully staffed and equipped research laboratory. Its facilities are devoted to customer service as well as improving Clad-Rex products.

Write and describe your product. See how Clad-Rex can work its broad effect on your manufacturing methods and costs. No obligation, of course.

COMPARISON OF FABRICATING PROCEDURE

Unfinished Sheet Metal	Clad-Rex Vinyl-Metal Laminate
FORMING	FORMING
CLEANING	CLEANING
INSPECTION	INSPECTION
GRINDING, ETC.	
INSPECTION	
SUB-ASSEMBLY	SUB-ASSEMBLY
INSPECTION	INSPECTION
CLEANING	
BONDERIZING	
INSPECTION	
FINISHING (multiple coats as required)	
INSPECTION	
STRIPPING of rejects	
REFINISHING	
INSPECTION	
FINAL ASSEMBLY	FINAL ASSEMBLY
INSPECTION	INSPECTION
STRIPPING of rejects	
REFINISHING	
INSPECTION	
RE-ASSEMBLY	
INSPECTION	
SHIPPING	SHIPPING

VINYL-METAL LAMINATES BY **CLAD-REX** DIVISION OF SIMONIZ COMPANY
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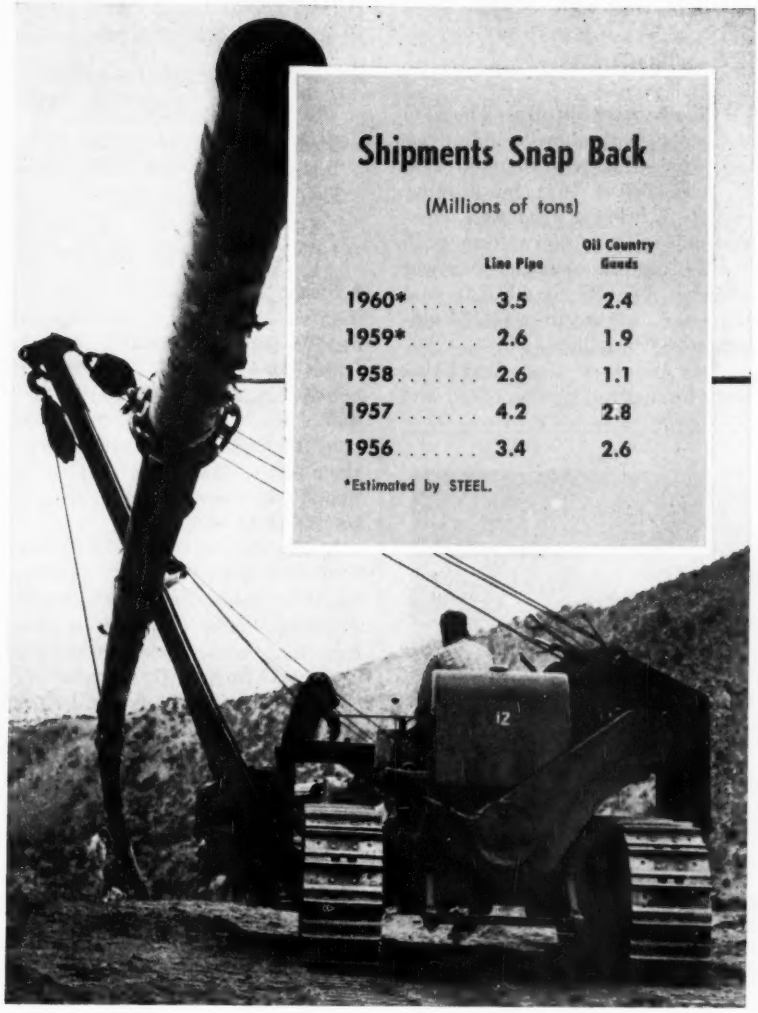


Shipments Snap Back

(Millions of tons)

	Line Pipe	Oil Country Goods
1960*	3.5	2.4
1959*	2.6	1.9
1958	2.6	1.1
1957	4.2	2.8
1956	3.4	2.6

*Estimated by STEEL.

Tube Demand Points Upward

BARRING resumption of the steel strike, next year will be a good one for producers of oil country goods, line pipe, valves, and compressors.

Construction expenditures by natural gas transmission and distribution companies are expected to set an all-time record of $1,898 million (vs. $1,859 million in 1959, $1,618 million in 1958). Drilling activity will increase only moderately (from this year's 50,500 wells to an estimated 52,000), but oil producers will need large quantities of tubing, casing, and drill pipe to replace strike depleted inventories.

Tubemakers estimate that they'll ship 2.4 million tons of oil country goods in 1960. If it hadn't been for the strike, this year's shipments would probably have reached 2.6 million. Consumers took more steel in the first half (1.48 million tons) than they bought in all of 1958 (1.16 million).

• **Inventories Depleted**—Although spot shortages of the most popular items (2⅜ and 2⅞ in. tubing; 4½ and 5½ in. casing) are worrying some operators, the major oil companies haven't had to curtail their drilling for lack of steel. Majors normally buy about 60 per cent of the pipe; independents, 40 per cent.

• **Delivery Outlook** — Oilmen attending the American Petroleum Institute's annual meeting (Chicago, Nov. 9-11) seemed worried about slow deliveries. Rebutting corridor gossip, J. E. Timberlake, sales vice president of Jones & Laughlin Steel Corp., assured them that they could expect a regular, organized schedule of shipments within 60 days of the startup.

A leading Midwestern producer hopes to ship August-September tonnage this month and October-November orders in January. It won't book any more casing and drill pipe until next month, tubing until February. "Oil country goods will be on allocation for the entire first half of next year," a competitor predicts.

• **Toward Smaller Sizes**—Since finding and lifting oil costs so much more in the U. S. than it does in the Middle East, American oil companies are looking for ways to cut corners. "Slim hole" drilling has caught their fancy because it requires less steel. In the last two years, tubemakers have seen a dramatic shift from 7 in. and 5½ in. OD casing to the 4½ in. size and from normal API tubing (2⅜ and 2⅞ in.) to "macaroni," the stuff under 2 in. that's used in dual completion drilling. Oil producers are cementing tubing into holes and using it as casing. Tubemakers aren't happy about the trend because it will reduce steel consumption per well and trim profits (they're better on larger sizes).

• **Pipelines Push**—As oil producers battle to maintain their markets, natural gas promoters struggle to expand theirs. "Natural gas is still the hottest thing in the petroleum industry," a veteran steelman observes.

From November, 1957, until December, 1958, pipeline construction was stymied by the so-called Memphis decision, a lower court's ruling that gas transmission companies couldn't raise their rates without first obtaining the consent of all their customers. When the Supreme Court reversed "Memphis" a year ago, pipeline companies resumed suspended projects and the Federal Power Commission speeded up its

handling of programs submitted for approval.

In the first ten months of 1958, the FPC approved 255 applications with an aggregate cost estimated at $590 million, involving 4566 miles of pipeline and 282,558 compressor horsepower.

In the first ten months of 1959, it approved 161 applications with an aggregate cost of $1,053 million, involving 10,751 miles of pipeline and 640,499 compressor horsepower.

Fewer applications (201) were filed in the first ten months of this year than in the corresponding period of 1958 (211). They were also worth less ($597 million vs. $702 million).

● **FPC's Backlog Shrinks**—The FPC had more applications pending on Oct. 31 of this year than on Oct. 31, 1958 (187 vs. 167), but in other respects its backlog was lower: Pipeline mileage was down from 8655 to 6014, compressor horsepower was off from 777,689 to 499,620, and value had declined from $1,134 million to $939 million.

The American Gas Association looks for natural gas pipelines and distributors to install 24,500 miles of additional line next year.

Type	Miles (hundreds) 1960	1959	1958
Distribution	140	139	154
Transmission	78	77	52
Field and gathering	27	25	20
Totals	245	241	226

● **Strong Demand**—During the last four weeks, line pipe ordering has been heavy—particularly in the larger sizes. Several producers are booked solidly through the first half of next year on 24 in. and larger pipe. Pipemakers who don't produce their own plates are having to limit order entry to a "capacity" set by plate availability.

Smaller sizes (16 in. OD and under) "aren't moving worth a hoot," a leading producer reports. Apparent reason: Oversupply problems have caused postponement of crude and product line extensions.

The American Gas Association expects 1960 to be a record year for purchase of nonfabricated steel by natural gas pipelines and distributors. They probably won't buy as much again until 1963 at the earliest, AGA believes. Breakdown by sizes:

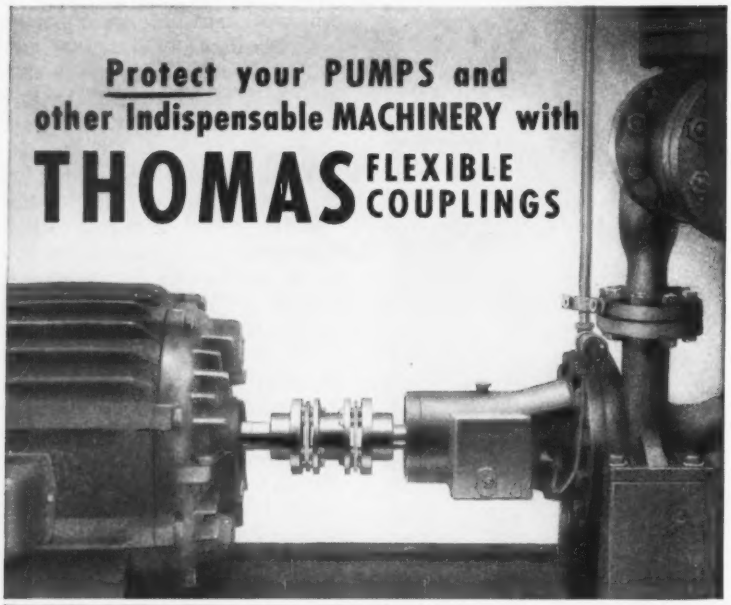
Pipe Size	1960	1959
	(Thousand of tons)	
Under 6 in.	395	316
6 to 14 in.	478	389
16 in. and over	1,709	1,273
Other steel (structurals, etc.)	7	5
Totals	2,589	1,983

● **Accessories Gain** — Valve and compressor manufacturers, heavily dependent on petroleum industry construction, expect 1960 sales to top this year's by about 10 per cent. For details, see next week's STEEL.

Tubular Goods . . .

Tubular Goods Prices, Page 205

Buyers are pressing tubemakers for shipments, apparently anticipating a resumption of the steel work stoppage late next month. Producers have more than enough business on books to support a high operating rate into the second quarter of next year. Consequently, they aren't too concerned if a regular customer places a "rush" order with another supplier.



Protect your PUMPS and other Indispensable MACHINERY with THOMAS FLEXIBLE COUPLINGS

NO LUBRICATION NO MAINTENANCE NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

- Freedom from Backlash
- Torsional Rigidity
- Free End Float
- Smooth Continuous Drive with Constant Rotational Velocity
- Visual Inspection While in Operation
- Original Balance for Life
- No Lubrication
- No Wearing Parts
- No Maintenance

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

Rotary drilling in the U. S. moved on the up side for the third consecutive week during the week ended Nov. 23. The Hughes Tool Co. survey showed 2206 rigs at work, 47 more than during the preceding week and 134 more than at the start of November.

Imported Steel Prices Holding in Southwest

Prices on imported steel products in the Southwest are unchanged, and regular buyers are not having much trouble getting their first quarter orders confirmed. Some observers think foreign prices may hold for at least three months even if the U. S. steel industry escapes another shutdown in January.

Brokers and speculators are in a difficult period. A settlement of the U. S. labor problem will deflate the foreign market eventually. But another shutdown of the domestic mills would strengthen prices on imported steel during the first quarter. However, foreign steel ordered now will not be delivered for three or four months.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 202 & 203

Sellers of hot and cold rolled and galvanized sheets are booked up well through May in some cases. But they haven't formally committed themselves to do more than supply their regular trade with as much steel as they can equitably distribute.

Buyers, excited about the possibility of a resumption of the work stoppage in January, are continuing to press the mills for every pound of metal they can get before the Taft-Hartley truce expires. Sheet sales executives say they're doing their best but advise customers to face the facts: They simply won't be able to rebuild their inventories during the "cooling off" period.

At the moment, there seems to be less pressure for sheet specialties compared with tonnage items, and, in many instances, producers are committing themselves for first quarter delivery, assuming no work stoppage. In general, it looks like erratic deliveries are likely through the first quarter as the mills work off backlogs extending back to July. Annealing facilities still aren't up to prestrike condition.

Premium-price sheets are still being offered and will probably be around until such time as the labor outlook improves and supply conditions are a lot better than they are at present.

Chrysler and Ford deny there is anything to rumors that they have been negotiating with Japanese mills for large sheet tonnages. It was said that Chrysler sought 85,000 tons of cold rolled, Ford 40,000 to 50,000 tons.

Plates . . .

Plate Prices, Page 201

While some mills are booked up solidly for the first quarter of next year on sheared plates, others, especially those producing only plates and plate specialties, can still accept some tonnage for early March delivery.

Over-all, there does not appear to be quite as much pressure for plates as there is for the other heavy steel products. However, producers anticipate plenty of demand throughout

GOLD STAR SR

This d-c rectifier type welder does more things better than any other welder of its class because —

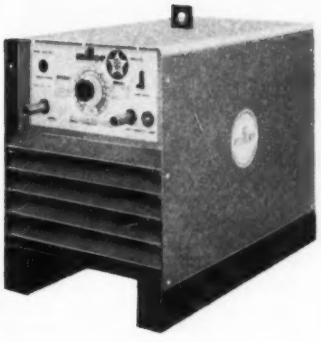
a. Its new transformer (Miller designed and built) has integral flux diverter.
b. Its new weld stabilized circuit delivers the ultimate in speed of metal deposition.
c. Its new completely sealed semi-metallic rectifier — designed for welding — provides the most efficient d-c for welding ever devised.

These features contribute to the Gold Star SR's greater arc stability, denser welds, easy arc starting and flexibility to handle all electrodes in all positions.

Performance-proved wherever profits are important, the Gold Star SR is available in single and duplex models of 200 to 1200 amperes at 60% duty cycle ratings.

miller WELDERS

GOLD STAR
All-Weather
SRH



The features that set the SR above and beyond the normal standards of welder performance belong to the SRH also. But, in addition to the horizontal design for easier stacking and paralleling, this welder has an "all-weather" construction that includes baked varnish coated transformers and rectifiers plus phosphatizing and painting of all base and sheet metal — even fan blades. Cam-Lok receptacles are standard equipment. The Gold Star SRH welds real well.

Complete specifications on these Gold Star models will be sent promptly.

miller ELECTRIC MANUFACTURING COMPANY, INC., APPLETON, WISCONSIN

• Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal

WHY MICROHONING* of Valve Tappet Bores Assures Economical Production, Precision and Functional Surfaces

Johnson Products, Inc., (Muskegon, Michigan) is a pioneer in the manufacturing of hydraulic valve tappets. Placing strong emphasis on quality control, they demand consistent precision and geometric accuracy. Here's why Johnson engineers insist on using the Microhoning process.

Typical Johnson valve tappet — cross section shows interrupted, semi-blind-end bore.

Generates Clean-Cut Surfaces

Microhoning is a low-velocity abrading process that uses a combination of controlled speeds, feeds and motions to provide functional surfaces. Also, the large area of contact between abrasive and work surface spreads and easily dissipates the cutting heat. Thus, Microhoning generates clean-cut work surfaces that are free of burned or smeared metal.

Produces Longer-Wearing Surfaces

Because the Microhoned surface is cleared of amorphous material, it is in the base metal zone where longer-wear characteristics are more readily induced. Also, the unique Microhoning cross-hatch lay pattern provides a multitude of minute "plateaus" for equitable distribution of work load.

Two of the double-spindle Hydrohoners, each spindle has its own sizing control.

Functional Accuracy

Geometric accuracy is mandatory! For, there must be a clearance of .0002"-.0003" between tappet bore and its plunger. Microhoning consistently holds bores within the .00003" tolerance for roundness and straightness, and within .0005" for size. Proof—each tappet assembly must pass a critical "leak-down" test.

Processing Economy

In a typical production run of 31,250 parts, scrap was only three-tenths of 1%. This is a striking example of economy resulting from consistent quality processing. The use of Microhoning also eliminated previously required precision boring — several boring machines were involved in this saving.

**Registered U.S. Pat. Off.*

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

the first half of next year, and they are discouraging the placing of orders for second quarter at this time.

Alloy plates are in strong demand from the utilities and various government agencies. Considerable government tonnage gets priority in rolling schedules. The chemical processing industry is taking tonnage steadily, especially alloy plates. Clad plates are also moving well.

Tin Plate . . .

Tin Plate Prices, Page 203

Although no tin plate consumers will get the tonnage they would like to have for many weeks, producers say regular buyers will "certainly get a fair share." Shipments will be tight for the next four to six months. Users who didn't order as much as they should have for the third quarter will feel the pinch most.

Prior to the strike, a leading producer had a three month order backlog. It hopes to have all of that tonnage shipped by Mar. 1. Orders taken today could probably be shipped in March or early April.

While a Pittsburgh area canmaker isn't getting as much tin plate as he would like, he says it's "not in too tight a situation." Operations are off about 25 per cent, but this is seasonal and doesn't reflect inability to get steel.

Steel Bars . . .

Bar Prices, Page 201

While there's a bit of a snafu in paperwork resulting from scheduling of orders that had piled up during the strike, most leading sellers of hot rolled bars think that by early January they'll be able to clean up most of the tonnage placed prior to the strike. They hope that by early April they'll be able to ship the great bulk of tonnage received during the walkout, at least on a historical pattern basis.

Some barmakers report that if they were to accept all of the tonnage requested by customers, they would be booked far into the second quarter. For the present, they are discouraging all second quarter business, assuring regular customers that they will do as much as they can to care for their needs when books are opened for the period.

Cold-finished bar suppliers in the Pittsburgh district are getting calls

from prospective customers all over the country who want sizes and grades that are all but impossible to obtain.

Auto part manufacturers are trying to build up their inventories before the automakers resume full schedules. The fastener industry is in relatively good shape, but firms that make axles and transmissions need all the steel they can get. The service centers are clamoring for bars.

Distributors . . .

Prices, Page 206

While major service centers are beginning to get more steel from the mills, their stocks of the popular sizes and grades of products are inadequate to meet their customers' requirements. Some believe that December bookings will be smaller than those in November, which, in turn, were off from the October volume.

The decline in November business reflected primarily unbalanced inventories. The likelihood of a further drop this month is expected to result from yearend holiday influences, combined with continued scarcity of products in the popular sizes.

Brokers handling premium priced tonnages are active in most of the large consuming areas. At least four such concerns are operating around Detroit.

Wire . . .

Wire Prices, Pages 203 & 204

Manufacturers' wire is in strong demand. Partmakers who supply the auto industry are taking advantage of the lull in auto assemblies to replenish their steel inventories. Although their stocks are low, they'll probably get additional steel soon enough to avoid production cutbacks or slowdowns.

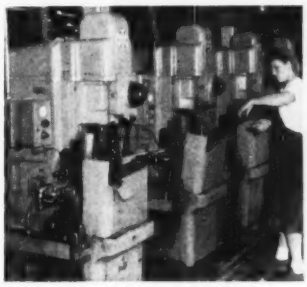
One leading wire producer in the Pittsburgh area figures it won't be able to clean up orders that were placed during the strike until the end of January. Because of the demand situation, it will have to ship on an allocation basis. Result: Some customers who placed more third quarter tonnage than they were entitled to will have to take less.

Resumption of operations at some auto plants that were recently

HOW MICROHONING of Valve Tappet Bores Generates Accuracy Within .00003", Eliminates Boring, Cuts Scrap Losses

To obtain functional surface qualities, engineers at Johnson Products, Inc. are insisting on Microhoning the bores of hydraulic valve tappets designed for long service or punishing usage. In addition, here is how Microhoning also generates consistently high accuracy, eliminates an extra operation and reduces scrap losses to a minimum.

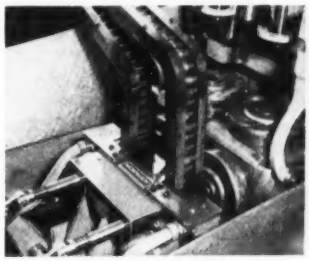
Automatic, Consistent Precision



Pictured is a line of four Model 738 Microhoners that typify the Microhoning equipment used by Johnson Products. Each machine has: automatic stonefeed and stonewear compensation (Microdial); automatic sizing unit (Gage Ring Air-Switch Microsize); air operated raising and lowering of fixture table assembly is synchronized with head controls for automatic operation.

Result: Johnson automatically obtains consistent precision as evidenced by these several facts. Microhoned bores are held within .00003" tolerance for roundness and straightness, within .0005" for size, and a specified surface finish of 12-14 microinches (rms) is generated. Also, from a typical production run of 31,250 parts, only three-tenths of 1% was scrap—a striking example of processing control and low scrap loss.

Flexible and Efficient Processing



Bore diameters of Microhoned tappets range from .656" to .800", and lengths from 1" to 2". Material is either cast iron, or iron alloy hardened to 55-60 R "C". In all, 15 different combinations of sizes and materials are Microhoned. Typical fixturing is shown to the right—it is designed to keep changeover time at a minimum.

From .004" to .005" stock is removed during the Microhoning cycle of 18 to 21 seconds. Cutting efficiency is boosted by the design of special Micromold tools. Intraflow features (within the tools) supply coolant directly to cutting zone.

We will gladly send more information on the Microhoning process and equipment—
WRITE FOR FREE LITERATURE

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DOW | MAGNESIUM PRODUCTS

ARE YOU GETTING ALL THESE BENEFITS WITH YOUR MAGNESIUM CASTINGS?

Dow magnesium foundry offers experience, production capacity for sand and permanent mold castings of all sizes and shapes.

The unique capabilities of Dow's Bay City, Michigan, foundry help users of magnesium sand and permanent mold castings. Activities at this facility—largest and best equipped of its kind—run the gamut from large volume production jobs to one-shot "specials".

Huge or tiny castings. The foundry is capable of producing castings weighing in excess of 3,000 lbs. down to ounces—in all degrees of complexity. Experienced pattern engineers ensure that the best use of casting processes is made. This can result in either lower costs, improved quality, better deliveries, or a combination of all three.

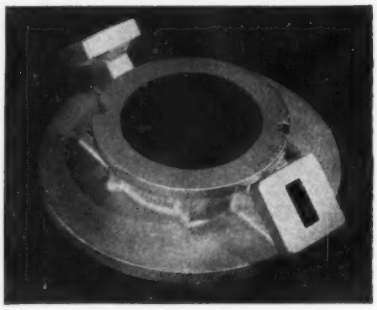
Newest techniques. Many milestones in magnesium casting have been reached at this Dow foundry. In fact, Bay City has men permanently assigned to developmental work, keeping the foundry in the forefront of technological advances at all times.

Results of their work include special processes for cast-in inserts and tubeless passages, and improved melting techniques. Casting methods have been developed for many of the newer magnesium alloys, such as the elevated temperature group and the new high damping capacity alloy, K1A.

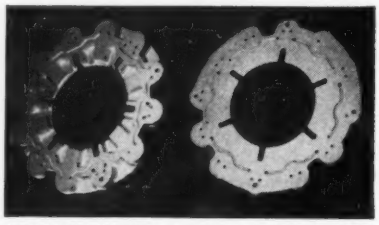
Quality control. A full time quality control team exhaustively checks all work, from alloy composition to the shipping dock. A direct-reading spectrometer makes rapid alloy composition analyses. Its speed is particularly valuable when alloying elements that are hard to hold in the molten state, such as thorium, are present. Chemical analysis is also frequently employed.

Testing facilities. Molding and sand cores are analyzed as a regular part of casting quality control. Radiography, fluorescent penetrant inspection and other testing facilities are used to check properties and specifications.

Experienced magnesium team. The foundry often draws upon the broad range of specialized experience available throughout the company. To Bay City customers, this means assurance of high quality work, done with utmost efficiency and economy. If your requirements involve magnesium castings, Dow can help you arrive at optimum casting design and reliably supply your production requirements.



THIS SAND CAST WAVE GUIDE was held to ±.005" on passageway dimensions. Surface smoothness requirements are 63 RMS. The foundry has government approval for any phases of its operations where such approvals are applicable.



THIS BRAKE CARRIER is sectioned to show how the hydraulic lines were integrated by use of tubeless passageway casting techniques.

WRITE TODAY for this illustrated brochure discussing Dow foundry services. THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Sales Dept. 1303LE12-7.

THE DOW METAL PRODUCTS COMPANY, Midland, Michigan

DIVISION OF THE DOW CHEMICAL COMPANY

closed by the steel shortage will result in a noticeable pickup in shipments of auto seat wire and springs. Demand for wire specialties, in general, is strong, and shipments are rising, though still geared to available rod supplies.

Most converters depleted their rod stocks during the strike and are pressing the mills for tonnage to meet their current needs.

Bids will be closed Dec. 21 by the U. S. Engineer, Chicago, on 2640 coils (132 tons) of carbon wire.

Iron, Steel Production At Record Pace in Canada

Iron and steel production in Canada is running at the highest rate in history. October output of steel ingots was 517,411 tons vs. 491,638 in September and 253,024 in October, 1958.

Output in the first ten months of the year was 4,709,277 tons vs. 3,477,460 in the like period of 1958 and 4,229,967 in the same 1957 period.

Production of pig iron in October was 361,269 tons vs. 362,421 in September and 229,459 in October, last year. For the first ten months the total was 3,458,096 tons vs. 2,502,669 in the like 1958 period and 3,204,326 in the same 1957 period.

Rails, Cars . . .

Track Material Prices, Page 204

The largest single order for ball bearing freight cars (2600) ever placed by an American railroad has been awarded the Bessemer (Ala.) plant of Pullman Inc. by the Louisville & Nashville Railroad. The order consists of 1700, seventy-ton open top hopper cars and 900, seventy-ton gondolas. They will cost $27,183,000. Construction will start in March, with completion in six months.

Semifinished Steel . . .

Semifinished Prices, Page 201

Steelmaking operations continue to make surprising gains. Last week they rose almost 3 points to 92.5 per cent of capacity, equal to weekly production of 2,619,000 net tons, largest since mid-June. A further rise is indicated before production begins to slacken for the yearend holidays.

The recovery from the strike has exceeded the expectations of most industry authorities. The ingot rate has gone up in successive steps since the Taft-Hartley truce reopened the mills. The first week rate was 45.6 per cent; the second 78.9; the third 89.7; the fourth 92.5.

Barrel, Drum Shipments Top Last Year's

Shipments of steel shipping barrels and drums in September totaled 2,383,519 units, 4 per cent below shipments in August, but 20 per cent above those in September a year ago, reports the U. S. Census Bureau.

The total for the first nine months of the year was 26,166,016 units vs. 23,657,842 in the like period last year.

The movement of 6,827,105 steel pails in the month was 1 per cent above shipments in August but 11 per cent below those in September, 1958.

Limits Equipment Awards To North American Firms

Tacoma (Wash.) city officials have adopted a policy limiting the award of generators and other machinery for the Mayfield Dam to North American manufacturers. The same policy may be extended to the Mossyrock Dam. Bids for Mayfield's three, 40,000 kw generators have been called Jan. 5.

General Electric Co., bidding $156,775, is apparently low to the U. S. Engineer for furnishing four, 115 kv circuit breakers for Ice Harbor Dam. However, Hitachi Co., New York, representing Japanese interests, is apparently low at $537,491 for the main unit transformer for the same project.

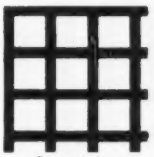
Structural Shapes . . .

Structural Shape Prices, Page 201

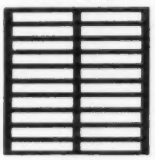
Continuing to draw from inventory, structural steel fabricators were able to ship 195,313 tons during October. Shipments, says American Institute of Steel Construction,

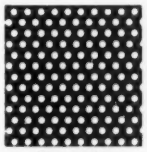
H&K PERFORATED MATERIALS

for Industrial or Decorative Uses

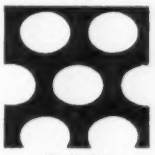

Square holes

THOUSANDS OF DIFFERENT PATTERNS AVAILABLE

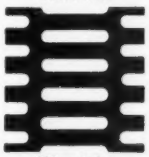

Slots


Round holes

H & K facilities enable the perforating of all metals, wood, plastics and cloth fabrics. Perforated materials can be furnished in sheets, coils, rolls or plates. Fabricating services include shearing, rolling, welding and forming.


Oval holes

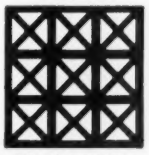
Perforated metal can be ordered with special finishes: aluminum—color anodized or brushed and lacquer finish; steel—painted, chrome plated, enameled, japanned or other baked-on finish. Decorative patterns can be embossed if requested.


Oblong holes

Many patterns in steel sheets (industrial or decorative) are in stock at our warehouses. Send for H & K Stock List Brochure.

FIND NEAREST H&K AGENT IN THE Yellow Pages

Listed Under "Perforated Metals"


Decorative patterns

Write to nearest H & K office today—for General Catalog

THE Harrington & King PERFORATING CO. INC.

Chicago Office and Warehouse
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New York Office and Warehouse
118 Liberty Street
New York, New York

were 7 per cent better than they were in the previous month and marked the first monthly improvement in deliveries since the start of the steel strike in July.

Total shipments for the first ten months were 2,487,947 tons, down 20 per cent from the movement in the like 1958 period.

October bookings were 244,060 tons, off about 14 per cent from the September total of 284,114 tons. In October, 1958, orders amounted to 259,016 tons.

Backlogs as of Oct. 31 were 1,891,116 tons—984,290 tons were scheduled for fabrication during the four months ending Feb. 29, 1960.

Fabricators report demand is lagging, mainly due to seasonal influences and uncertainty regarding steel supply. Most shops look for no early improvement. However, highway work continues fairly active, though spotty. A few industrial projects are developing and will be out for bids early in the new year.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2000 tons, building, Bowman Biscuit Co., Denver, to Burkhardt Steel Co., Denver, through Long Construction Co., Denver, general contractor.

650 tons, high school, Irving, Tex., to Industrial Steel Products Co., Dallas, through Yates Construction Co., Dallas, general contractor.

500 tons, brewery addition, Anheuser-Busch Inc., Tampa, Fla., to Stupp Bros. Bridge Co., St. Louis, through George A. Fuller Co., Atlanta, general contractor.

350 tons, building Philco Corp., Philadelphia, to Frank M. Weaver & Co., Lansdale, Pa.

350 tons, steel for Bonneville Power Administration, Portland, Oreg., to Pacific Coast Div., Bethlehem Steel Co., Seattle; previously reported placed with a Texas firm. Bethlehem was low at $92,515.

325 tons, transistor-rectifier plant, RCA, Wilkes-Barre, Pa., to the Wilkes-Barre Iron & Wire Works, Luzerne, Pa.; also, 150 tons of reinforcing bars to Bethlehem Steel Co., Bethlehem, Pa.; placed through Sorboni Construction Co., Wilkes-Barre, Pa.

165 tons, hospital, Pennsylvania General State Authority, Shamokin, Pa., to the Anthracite Bridge Co., Scranton, Pa.

130 tons, state highway bridge, Stockton, Maine, to American Bridge Div., U. S. Steel Corp., Pittsburgh; Norman E. Jackson Inc., Pittsfield, Maine, bridge contractor.

110 tons, high school, Winchendon, Mass., to Stafford Iron Works, Worcester, Mass.; V. A. Cusandello Contracting Co., Worcester, general contractor.

STRUCTURAL STEEL PENDING

759 tons, state bridgework, Dauphin County, Pennsylvania; bids Dec. 18; 445 tons of reinforcing bars are also required.

589 tons, state bridgework, Washington County, Pennsylvania; bids Dec. 18; 435 tons of reinforcing bars are also required.

200 tons, state bridgework, Chester County, Pennsylvania; bids Dec. 18; 732 tons of reinforcing bars are also required.

100 tons, John Day Dam; bids to the U. S. Engineer, Walla Walla, Wash., postponed to Dec. 10.

Unstated, boiling water reactor, Idaho reactor station; Arrington Construction Co., Idaho Falls, Idaho, low at $721,275 to the Atomic Energy Commission.

REINFORCING BARS . . .

REINFORCING BARS PLACED

110 tons, high school, Winchendon, Mass., to Northern Steel Inc., Boston; V. A. Cusandello Contracting Co., Worcester, Mass., general contractor.

50 tons, St. Monica Catholic School, Mercer Island, to Pacific Coast Div., Bethlehem Steel Co., Seattle.

REINFORCING BARS PENDING

8850 tons, John Day Dam, Columbia River; bids to U. S. Engineer, Walla Walla, Wash., postponed to Dec. 10.

2000 tons, also concrete girders, Capital Hill section, Seattle Freeway; Morrison-Knudsen Inc. and Rumsey & Co., Seattle, joint low bid at $3,982,242 to Washington State; award in January.

732 tons, state bridgework, Chester County, Pennsylvania; bids Dec. 18; also, 200 tons of structurals are required.

445 tons, state bridgework, Dauphin County, Pennsylvania; bids Dec. 18; 759 tons of structurals are also required.

435 tons, state bridgework, Washington County, Pennsylvania; bids Dec. 18; 589 tons of structurals are also required.

417 tons, state bridgework, Washington County, Pennsylvania; bids Dec. 18.

175 tons, two steel beam bridges, Contract No. 2, Northfield-Tilton, N. H.; also, 125 tons of steel bearing piles.

127 tons, state bridgework, Susquehanna-Wayne counties, Pennnsylvania; bids Dec. 18.

Unstated, motel and swimming pool addition, Chinook Hotel, Yakima, Wash.; bids Dec. 9.

Unstated, 8000 seating capacity ball park, Tacoma, Wash.; bids in.

Unstated, 190 ft. M Street railroad overpass, Tacoma, Wash.; Woodworth & Co. Inc., Tacoma, low at $121,602.

Unstated, pumphouse and facilities, Hanford Works; Jensen-Rasmussen Co., Sunnyside, Wash., and B.E.C.K., Seattle, joint low bid at $787,163 to Kaiser Engineers, subcontractor to the Atomic Energy Commission.

Unstated, Oregon State dual reinforced concrete highway bridges, Jackson County; bids to Salem, Oreg. Dec. 8.

Unstated, Oregon State railway overpass, 335 ft, Lane County; bids to Salem, Oreg., Dec. 8.

Unstated, Oregon State highway bridges in Jackson, Josephine, and Lincoln counties; bids to Salem, Oreg., Dec. 8.

PLATES . . .

PLATES PLACED

549 tons, General Stores Supply Office, Navy, Philadelphia, to C. Itoh & Co. (America) Inc., New York.

411 tons, General Stores Supply Office, Navy, Philadelphia, to Caine Steel Co., Chicago.

284 tons, General Stores Supply Office, Navy, Philadelphia, to Phoenix Steel Corp., Harrisburg, Pa.

205 tons, General Stores Supply Office, Navy, Philadelphia, to Wickwire Spencer Div., Colorado Fuel & Iron Corp., Wilmington, Del.

159 tons, General Stores Supply Office, Navy, Philadelphia, to Leifer Bros. Steel Co. Inc., New York.

PLATES PENDING

500 tons or more, 7 mile, $1.8 million Mercer Island pipeline; plans approved by Seattle; bids tentatively set for Dec. 23.

250 tons, three fuel storage tanks, Naval Air Station, Lemoore, Calif., bids Dec. 16 to the Twelfth Naval District, San Bruno, Calif.

100 tons or more, steel reservoir; bids to Bend, Oreg., Jan. 6; Cornell, Howland, Haycox & Merryfield, Corvallis, Oreg., engineer.

RAILS, CARS . . .

RAILROAD CARS PLACED

Louisville & Nashville, roller-bearing freight cars, 1700 seventy-ton open-top hoppers, 900 seventy-ton gondolas, and 108 seventy-ton covered hoppers going to the Pullman-Car Div., Pullman Inc., Chicago, and 250 fifty-ton boxcars and 42 seventy-ton covered hoppers going to ACF Industries, New York.

DISTRICT INGOT RATES

(Percentage of capacity engaged)

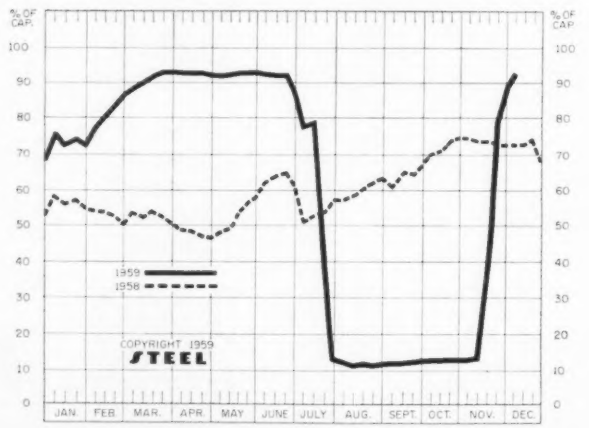
	Week Ended Dec. 6	Change	Same Week 1958	Same Week 1957
Pittsburgh	93	+ 1.5*	67	75
Chicago	91.5	+ 4.5*	85	75
Eastern	93	+ 3	71	82
Youngstown	98	0	60	71
Wheeling	93	+ 5	83	60.5
Cleveland	92.5	+ 2.5*	70	70.5
Buffalo	107.5	+ 7.5	66	63.5
Birmingham	88.5	+ 5.5	62.5	61.5
Cincinnati	100	+ 3.5	81.5	73
St. Louis	106	+ 2.5*	88	75.5
Detroit	95	+ 2.5*	100	89.5
Western	92	+10	80	84
National Rate	92.5	+ 2.8*	74.5	71.5

INGOT PRODUCTION

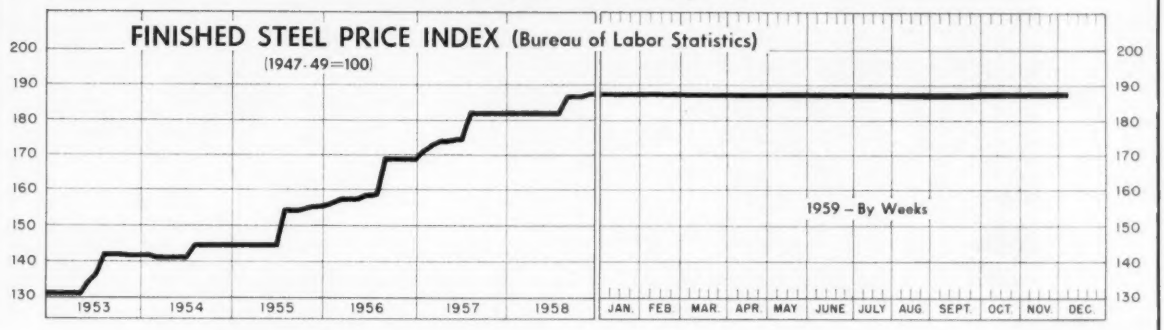
	Week Ended Dec. 6	Week Ago	Month Ago	Year Ago
INDEX (1947-49=100)	163.0†	158.1	22.9	123.6
NET TONS (In thousands)	2,619†	2,540	368	1,985

*Change from preceding week's revised rate.
†Estimated by STEEL; comparative figures reported by AISI.
Weekly capacity (net tons): 2,831,331 in 1959; 2,699,173 in 1958; 2,559,490 in 1957.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



Dec. 1, 1959	Week Ago	Month Ago	Nov. Index	Year Ago
186.8	186.8	186.8	186.8	186.9

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 1

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, Reinforcing	6.385
Rails, Light, 40 lb	7.292	Bars, C.F., Carbon	10.710
Tie Plates	6.875	Bars, C.F., Alloy	14.125
Axles, Railway	10.175	Bars, C.F., Stainless, 302 (lb)	0.570
Wheels, Freight Car, 33 in. (per wheel)	62.000	Sheets, H.R., Carbon	6.350
Plates, Carbon	6.350	Sheets, C.R., Carbon	7.300
Structural Shapes	6.167	Sheets, Galvanized	8.735
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Strip, C.R., Carbon	9.489
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Alloy	10.775	Strip, H.R., Carbon	6.250
Bars, H.R., Stainless, 303 (lb)	0.543	Pipe, Black, Buttweld (100 ft)	19.905
Bars, H.R., Carbon	6.675	Pipe, Galv., Buttweld (100 ft)	23.420
		Pipe, Line (100 ft)	199.533
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	315.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
		Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (bundles)	7.967
		Nails, Wire, 8d Common	9.825
		Wire, Barbed (80-rod spool)	8.742
		Woven Wire Fence (20-rod roll)	21.765

STEEL's FINISHED STEEL PRICE INDEX*

	Dec. 2 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$117.95
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	42.67	43.50	45.33	39.67	32.58

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 2 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton	Dec. 2 1959	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	50.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.) deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$40.50	$41.50	$45.50	$41.50	$32.50
No. 1 Heavy Melt, E. Pa.	45.00	45.00	45.00	35.00	32.25
No. 1 Heavy Melt, Chicago	42.50	44.00	45.50	42.50	33.00
No. 1 Heavy Melt, Valley	43.50	43.50	44.50	42.50	34.50
No. 1 Heavy Melt, Cleve.	40.50	40.50	41.50	39.00	32.50
No. 1 Heavy Melt, Buffalo	33.50	39.50	33.50	33.50	30.50
Rails, Rerolling, Chicago	64.50	64.50	64.50	63.50	52.50
No. 1 Cast, Chicago	56.50	57.50	57.50	45.50	39.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.25	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	30.50	25.25

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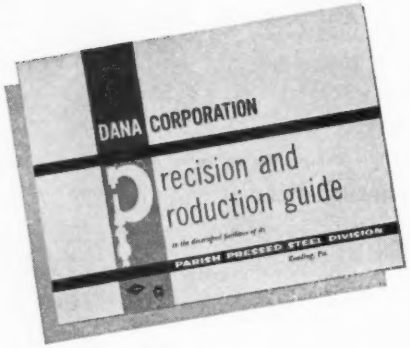

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Steel Prices

Mill prices as reported to STEEL, Dec. 2, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 202; footnotes, page 204.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 .....82.00
Munhall Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)
Bartonville,Ill. K4 ...$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ..80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 ....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 ....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3..126.00
Detroit S41 .....119.00
Economy,Pa. B14 .....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity, Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago Ill. R2 W14..6.40
SparrowsPoint,Md. B2..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1..5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 5.50
S.SanFrancisco B3 ...6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W16 ....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling, Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 ....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ..5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 ....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1 5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14 5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5 Y1 .....5.30
Youngstown(27) R2 ..5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....13.55

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairtown,Pa. U5 .....7.95
Claymont,Del. C22 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1 7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2..7.95
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 ....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell Pa. S3 .....7.50
Fontana,Calif K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 .6.375
Ind.Harbor,Ind. I-2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10 .6.05
Cleveland c.l. R2 .....6.05
Warren,O. c.l. R2 ....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ..5.675
Aliquippa,Pa. (9) J5 ..5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ..5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa. (9) U5 ..5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ..5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ..5.825
Fontana,Calif.(9) K1..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1 5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ...6.15
Midland,Pa.(23) C18 ..6.025
Milton Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro Ky.(9) G8..6.025
Pittsburg,Calif.(9) C11 6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle A24, B3 N14..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ...5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 6.375
Warren O. C17 .....6.052
Youngstown(9) R2,U5 ..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.275
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1..6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. R2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14 8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9)S5 ..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda N.Y. B12 ..5.675

BAR SIZE ANGLES; S. Shapes
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded (Including loaded extra) Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ..10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.05c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ..7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2 9.10
Mansfield Mass. B5 ....8.20
Massillon,O. R2 R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ..8.15
Youngstown F3, Y1 ...7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19..6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2 ..9.025
Hartford,Conn. R2 ....9.325
Harvey Ill. B5 .....9.025
Lackawanna,N.Y. B2..9.025
LosAngeles P2, S30 ....11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 ....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless Pa. U5 .....5.825
Fontana,Calif. K1 .....6.375
Ft. Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind. Harbor,Ind. I-2,Y1 5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 ....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14 .6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
SandSprings,Okla. S5 ..7.60
Seattle A24, B3, N14 .7.95
SparrowsPt.,Md. B2 ...7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(8.R.)B14 14.90
Economy,Pa.(D.R.)B14 18.55
Economy(Staybolt)B14 19.00
McK.Rks.(8.R.) L5 ..14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.675
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ...5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ...5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ..7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 ....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W. Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2 ..6.275
Steubenville,O. W10 ..6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 ....9.275
Cleveland J5, R2 ....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(37) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(38) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	7.75
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill. G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2.6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975•
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C-16 ....6.975‡
MartinsFerry,O. W10. .6.875•
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625•
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Aluminum Coated

Butler,Pa. A10(type 1) 9.525
Butler,Pa. A10 (type 2) 9.625

SHEETS, Enameling Iron

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Follansbee,W.Va. F4 ..8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key To Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&FuelAssoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel Corp.
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R6 Roebling's Sons, John A.
R8 Reliance Div.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J&L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring Corp.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Younstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ...5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Buffalo(27) R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 .....5.10
S.SanFrancisco(25) B3..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn,Mich. S3 .....7.425
Detroit D2, M1, P20....7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 .....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10.7.875
NewBritain,Conn. S15..7.875
NewCastle,Pa. B4, E5..7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3 ....7.975
Pawtucket,R.I. N8 ....7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Wallingford,Conn. W2..7.875
Warren,O. R2, T5 .....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie, Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. N8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ...10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.60
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif.K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Ind.Harb. Y1	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va.W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.30
Fairless,Pa. U5 .....8.30
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 .....8.30
Ind.Harbor,Ind. I-2, Y1.8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 .....8.20
Youngstown Y1 .....10.80

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

STRIP, C.R. Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1..7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.65
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed 1½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	....	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	....	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	....	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	....	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	....	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	....	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	....	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift,Pa. U5	8.10
Mansfield,O. E6	8.10
Warren,O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths) Fully Processed (Semiprocessed 1½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 ....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ..8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 .....8.00
Rankin,Pa. A7 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ...8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

Wire, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa. B2 .....13.40
KansasCity,Mo. U3 ...12.90
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 .....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 .....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md. B2 ...13.50
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa P7, P16 ..9.75
NewHaven,Conn. A7 ...10.05
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.70
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.70
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

WIRE, Tire Bead

Bartonville,Ill. K4 ....17.15
Monessen,Pa. P16 .....17.15
Roebling,N.J. R5 .....17.65

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
KansasCity,Mo. U3 ....13.70
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5 .....$10.05
Irvin,Pa. U5 .....10.05

Wire, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock — **Col.**

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler
(14½ Ga.Iper 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$9.24
Atlanta A11	10.36
Bartonville,Ill. K4	9.34
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	9.34
Donora,Pa. A7	9.24
Duluth A7	9.24
Fairfield,Ala. T2	10.51
Houston S5	10.51
Jacksonville,Fla. M8	9.34
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	9.24
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	9.34
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	9.94
S.Chicago,Ill. R2	9.24
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill.(37) N15	9.34

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.54
Atlanta A11	10.70
Bartonville,Ill. K4	9.64
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.64
Donora,Pa. A7	9.54
Duluth A7	9.54
Fairfield,Ala. T2	9.54
Houston S5	10.85
Jacksonville,Fla. M8	9.64
Johnstown,Pa. B2	10.60
Joliet,Ill. A7	9.54
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.64
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	10.28
S.Chicago,Ill. R2	9.54
S.SanFrancisco C10	11.40
SparrowsPt.,Md. B2	10.70
Sterling,Ill.(37) N15	9.64

Coil. No. 6500 Interim

AlabamaCity,Ala. R2	$9.59
Atlanta A11	10.75
Bartonville,Ill. K4	9.69
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.69
Donora,Pa. A7	9.59
Duluth A7	9.59
Fairfield,Ala. T2	9.59
Houston S5	10.90
Jacksonville,Fla. M8	9.69
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	9.59
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	9.69
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	10.31
S.Chicago,Ill. R2	9.59
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill.(37) N15	9.69

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — **Col.**

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — **Col.**

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage) — **An'ld Galv. Stone** — **Stone**

Ala.City,Ala. R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville B8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.25	18.80†
Minnequa C10	18.10	19.65**
P'im'r,Mass.W12	18.15	19.70†
Pitts.Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant quality

(6 to 8 gage)	**An'ld Galv.**	
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48)A11	9.10	9.775§
Bartonville(48) K4	9.10	9.80
Buffalo W12	9.00	9.55†
Cleveland A7	9.00	....
Crawfordsville M8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55†
Houston(48) S5	9.25	9.80**
Jack'ville,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansCity(48) S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48) N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc price of: *13.50, †5c, ‡10c. ‡‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, shipments of one to four containers, per cent off list, f.o.b. mill)

BOLTS

Machine Bolts
Full Size Body (cut thread)
½ in. and smaller:

3 in. and shorter	55.0
3¼ in. thru 6 in.	50.0
Longer than 6 in.	37.0
⅝ in., 3 in. & shorter	47.0
3¼ in. thru 6 in.	40.0
Longer than 6 in.	31.0
¾ in. thru 1 in.:	
6 in. and shorter	37.0
Longer than 6 in.	31.0
1⅛ in. and larger:	
All lengths	31.0

Undersize Body (rolled thread)
½ in. and smaller:

3 in. and shorter	55.0
3¼ in. thru 6 in.	50.0

Carriage Bolts
Full Size Body (cut thread) & Undersize Body (rolled thread)
½ in. and smaller:

6 in. and shorter	48.0
Larger diameters and longer lengths	35.0

Lag, Plow, Tap, Blank, Step, Elevator, Tire, and Fitting Up Bolts
½ in. and smaller:

6 in. and shorter	48.0
Large diameters and longer lengths	35.0

High Tensile Structural Bolts (Reg. semifinished hex head bolts, heavy semifinished hex nuts. Bolts — High-carbon steel, heat treated, Spec. (ASTM A-325, in bulk. Full keg quantity)

⅝ in. diam	50.0
¾ in. diam	47.0
⅞ and 1 in. diam.	43.0
1⅛ and 1¼ in. diam	34.0

NUTS

(Keg or case quantity and over)

Square Nuts, Reg. & Heavy:

All sizes	56.0

(Full container)

Hex Nuts, Reg. & Heavy
Hot Pressed & Cold Punched:

¾ in. and smaller	62.0
⅞ in. to 1½ in., incl.	56.0
1⅝ in. and larger	51.5

Hex Nuts, Semifinished, Heavy (Incl. Slotted):

¾ in. and smaller	62.0
⅞ in. to 1½ in. incl.	56.0
1⅝ in. and larger	51.5

Hex Nuts, Finished (Incl. Slotted and Castellated):

⅞ in. and smaller	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger	51.5

Semifinished Hex Nuts, Reg. (Incl. Slotted):

⅝ in. and smaller	62.0
¾ in. to ⅞ in., incl.	65.0
1 in. to 1½ in., incl.	57.0
1⅝ in. and larger	51.5

CAP AND SETSCREWS
(Base discounts, packages, per cent off list, f.o.b. mill)
Hex Head Cap Screws, Coarse or Fine Thread, Bright:
6 in. and shorter:

⅝ in. and smaller	35.0
¾, ⅞, and 1 in.	16.0
Longer than 6 in.:	
⅝ in. and smaller	3.0
¾, ⅞, and 1 in.	+11.0

High Carbon, Heat Treated:
6 in. and shorter:

⅝ in. and smaller	20.0
¾, ⅞, and 1 in.	+ 5.0

Longer than 6 in.:

⅝ in. and smaller	+19.0
¾, ⅞, and 1 in.	+39.0

Flat Head Cap Screws:
¾ in. and smaller, 6 in. and shorter +85.0
Setscrews, Square Head, Cup Point, Coarse Thread:
Through 1 in. diam:
6 in. and shorter. + 5.0
Longer than 6 in. +29.0

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.
Structural ½ in., larger 12.85
⅞ in. and smaller by 6 in. and shorter: 15% off list.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1⅝	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2⅝	12	58.73	68.83	52.13
3	12	62.62	73.40	55 59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2,Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill hands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.635c.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds; 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25
Youngstown Y1	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+27.25	+5.75	+22.5	+3.25	+20	+1.75	+18.5	+1.75	+18.5	+2	+18.75	0.5	+16.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Alton, Ill. L1	....	....	....	....	....	....	0.25	+15	3.25	+11	6.75	+6.5	9.25	+5.75
Benwood, W. Va. W10	1.5	+25	+10.5	+34	+21	+42.5	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Butler, Pa. F6	4.5	+22	+8.5	+32	+19.5	+41	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+15	3.25	+11	6.75	+6.5	9.25	+5.75
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+26	+7.75	+22	+4.25	+17.5	+1.75	+16.75
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+14	4.25	+10	7.75	+5.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Sharon, Pa. S4	4.5	+22	+8.5	+32	+19.5	+41	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Sparrows Pt., Md. B2	2.5	+24	+10.5	+34	+21.5	+43	0.25	+15	3.25	+11	6.75	+6.5	9.25	+5.75
Wheatland, Pa. W9	4.5	+22	+8.5	+32	+19.5	+41	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+13	5.25	+9	8.75	+4.5	11.25	+3.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Alton, Ill. L1	9.75	+4.75	10.25	+4.25	11.75	+4.5	11.75	+4.5	1.25	+15.5	1.25	+15.5
Benwood, W. Va. W10	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Etna, Pa. N2	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Fairless, Pa. N3	9.75	+4.75	10.25	+4.25	11.75	+4.5	11.75	+5.5	1.25	+15.5	1.25	+15.5
Fontana, Calif. K1	+1.25	+15.75	+0.75	+15.25	0.75	+15.5	0.75	+15.5	+9.75	+26.5	+9.75	+26.5
Indiana Harbor, Ind. Y1	10.75	+3.75	11.25	+3.25	12.75	+3.5	12.75	+3.5	2.25	+14.5	2.25	+14.5
Lorain, O. N3	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	....	....	....	....
Sharon, Pa. M6	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+4.75	10.25	+4.25	11.75	+4.5	11.75	+4.5	1.25	+15.5	1.25	+15.5
Wheatland, Pa. W9	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5
Youngstown R2, Y1	11.75	+2.75	12.25	+2.25	13.75	+2.5	13.75	+2.5	3.25	+13.5	3.25	+13.5

*Galvanized pipe discounts based on price of zinc at 11.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary, Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
*Copper**	*$36.80*	*$44.20*

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.165
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago, Ill. R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	68.00	68.50	69.00	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.03-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles, Tenn. T3 (Phos. 0.035% max)	$73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075%)	71.00
Erie Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00

Steel Service Center Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no change.

	SHEETS				STRIP	BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Galv. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R Alloy 4140††[5]		Carbon	Floor
Atlanta	8.59§	9.86§	10.13	....	8.91	9.39	13.24#	....	9.40	9.29	11.21
Baltimore	9.80[a]	10.60[b]	10.06	....	11.45[c]	10.05[d]	11.80#	16.38	9.55	9.90[e]	10.50
Birmingham	9.43[a]	10.20[b]	....	....	10.91[c]	9.59[d]	13.14#	16.76	9.00	9.79[e]	10.90
Boston	10.07	11.42	11.92	53.50	12.17	10.19	13.30#	15.64	10.64	10.27	11.95
Buffalo	8.40	9.60	10.85	55.98	8.75	9.15	11.45#	15.40	9.25	9.20	10.75
Chattanooga	8.35	9.69	9.65	....	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.25	9.45	10.90	53.00	8.51	8.99	9.15	15.05	9.00	8.89	10.20
Cincinnati	8.43	9.51	10.95	53.43	8.83	9.31	11.58#	15.37	9.56	9.27	10.53
Cleveland	8.54[a]	8.79[b]	10.87	52.33	10.32[c]	8.75[d]	11.25#	15.16	9.39	8.71[e]	10.50[f]
Dallas	8.80	9.30	....	....	8.85	8.80	....	....	8.75	9.15	10.40
Denver	9.40	11.84	12.94	....	9.43	9.80	11.19	....	9.84	9.76	11.08
Detroit	8.51	9.71	11.25	56.50	8.88	9.30	9.51	15.33	9.56	9.26	10.46
Erie, Pa.	8.35	9.45	9.95[10]	....	8.60	9.10	11.25	....	9.35	9.10	10.60
Houston	9.65[a]	9.65[b]	....	52.00	10.85[c]	8.90[d]	13.10#	16.55	8.35	9.65[e]	10.10
Jackson, Miss.	8.52	9.79	....	....	8.84	9.82	10.68	....	9.33	9.22	11.03
Los Angeles	8.70[2]	10.82[2]	12.20	57.60	9.15	9.10[2]	12.95[2]	16.35	9.00[2]	9.10[2]	11.30[2]
Memphis, Tenn.	8.59	9.80	....	....	8.84	9.32	11.25#	....	9.33	9.22	10.86
Milwaukee	8.39	9.59	11.04	....	8.65	9.13	9.39	15.19	9.22	9.03	10.34
Moline, Ill.	8.55	9.80	....	....	8.84	8.95	9.15	....	8.99	8.91	....
New York	9.17	10.49	11.35	53.08	9.64	9.99	13.25#	15.50	9.74	9.77	11.05
Norfolk, Va.	8.65	....	....	....	9.15	9.30	12.75	....	9.65	9.10	10.50
Philadelphia	8.20	9.55	10.61	52.71	9.25	9.40	11.95#	15.48	9.10	9.15	10.40**
Pittsburgh	8.54[a]	8.79[b]	10.76	52.33	10.30[c]	8.64[d]	11.25#	15.05	9.00	8.47[e]	10.26[f]
Richmond, Va.	8.65	....	10.79	....	9.15	9.55	....	....	9.65	9.10	10.60
St. Louis	8.63	9.83	11.28	....	8.89	9.37	9.78	15.43	9.48	9.27	10.58
St. Paul	8.50[a]	9.31[b]	10.47	....	10.32[c]	8.70[d]	11.49#	16.54	9.38	8.60[e]	10.49
San Francisco	9.65	11.10	11.40	55.10	9.75	10.15	13.60	16.25	9.85	10.00	12.35
Seattle	10.30	11.55	12.50	56.52	10.25	10.50	14.70	16.80[2]	10.20	10.10	12.50
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	....	....	9.57	9.57	10.91
Spokane	10.30	11.55	12.50	57.38	10.75	11.00	14.70	16.80	10.20	10.10	13.00
Washington	9.15	....	....	....	9.65	10.05	12.50	....	10.15	9.60	11.10

*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **¼ in. and heavier; ††as annealed; ‡‡⅝ in. to 4 in. wide, inclusive; #net price. 1 in. round C-1018.

[a]10 Ga.; [b]20 Ga.; [c]⅛ x 1 in.; [d]⅜-2½ in.; [e]1/4 x 84 in.; [f]¼ x 36 in.

Base quantities, 2000 to 4999 lb except as noted; cold-finished bars, 2000 lb and over except in Seattle, 2000 to 3999 lb; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Seattle, 30,000 lb and over; [2]—30,000 lb; [5]—1000 to 4999 lb; [10]—2000 lb and over.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchens, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo. Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thorton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 sts.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid $26.50-$27; barge, Brownsville, Tex., $29-$29.50.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	*$17.50-18.00**
Domestic, concentrates f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian 88-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.00†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

50-55%	*$2.35-2.50*
60-65%	*2.60-3.20*

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, oven	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	5.00
Toluene one deg (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant

Ammonium sulfate, regular grade	$32.00

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 240 tons price is 22.75c)	
Annealed, 99.5% Fe.	36.75
Unannealed (99+% Fe)	33.25
Unannealed (99+% Fe) (minus 325 mesh)	58.25
Powder Flake (minus 16 plus 100 mesh).	29.25
Carbonyl Iron: 98.1-98.9%, 3 to 20 microns, depending on grade, 93.00-290.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500-lb drum, freight allowed, c.l. 38.50; ton lots 40.50	
Antimony, 500-lb lots	42.00*
Brass, 500-lb lots	35.70-52.20†
Bronze, 5000-lb lots	53.50-57.50†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	54.00-58.30†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-55.00
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00*
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	20.70-33.90‡
Tungsten: Carbon reduced, 98.8% min, minus 65 mesh	Dollars nom**
Chromium electrolytic 99.8% Cr, min, metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes*	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$6.60	....	$6.55	$6.46	$6.95
Bar Size Angles	6.60	....	6.55	6.46	6.95
Structural Angles	5.93	....	5.88	5.78	6.18
I-Beams	5.93	....	5.88	5.78	6.18
Channels	5.93	....	5.88	5.78	6.18
Plates (basic bessemer)	6.30	....	6.25	6.15	6.55
Sheets, H.R.	9.50	....	9.45	9.35	9.75
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	10.40	....	10.35	10.25	10.75
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	10.55	....	10.50	10.40	10.80
Sheets, C.R. (drawing quality)	12.00	....	12.95	12.85	13.25
Furring Channels, C.R., 1000 ft, ⅞ x 0.30 lb per ft	25.50	....	25.28	24.99	26.68
Barbed Wire (†)	8.25	....	8.20	8.10	8.50
Merchant Bars	6.58	....	6.53	6.44	6.81
Hot-Rolled Bands	9.90	....	9.85	8.75	10.15
Wire Rods, Thomas Commercial No. 5	6.40	....	6.40	6.25	6.60
Wire Rods, O. H.	6.90	....	6.90	6.75	7.10
Bright Common Wire Nails (§)	9.00	....	9.05	8.95	9.35

*Books closed for 1959-60 shipping season. †Per 82 lb net reel. §Per 100-kegs, 20d nails and heavier.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Neville Island, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $245, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.5% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn; packed, carload 26.8c, ton lot 28.4c, less ton 29.6c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome 1: Cr 63%, C 6% max, Si 7% max, 22c. **Charge Chrome 2:** Cr 50-59%, C 8% max, Si 6% max, 23c. Carload, lump, bulk, per lb Cr.

Refined Chrome 1: Cr 50-59%, C 5% max, Si 2% max, 25c. **Refined Chrome 2:** Si 12% max, 24c. Carload, lump, bulk, per lb Cr.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Delivered.

Cr 67-71%, carload, lump, bulk, 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy, carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" x down, 28.25c per lb contained Cr, 14.60c per lb contained Si, 0.75" x down 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lots 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 14.8c per lb of briquet; c.l., packed, bags 16c; 3000 lb to c.l., pallets 16c; 2000 lb to c.l., bags 17.2c; less ton 18.1c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 15.1c per lb of briquet; c.l. packed, bags 16.3c; 3000 lb to c.l., pallets 16.3c; 2000 lb to c.l., bags 17.5c; less ton 18.4c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 40% approx, Ta 20% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carlot bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (55-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans, $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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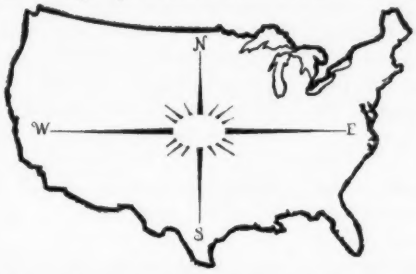

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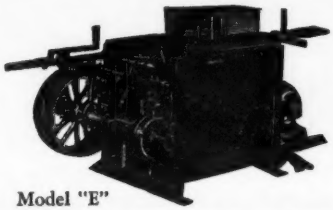

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W 3

Scrap Retreating to Lower Level

STEEL's index on heavy melting grade drops another 83 cents a ton to $42.67. Mill buying fails to develop in volume despite rapid steel production rise during Taft-Hartley truce

Scrap Prices, Page 210

● **Philadelphia** — The tone of the market is easier, and some prices are off. No. 1 busheling is quoted at $48, and low phos structurals and plates at $51-$52, delivered.

● **New York**—Brokers have reduced their buying prices $1 a ton on the leading grades of open hearth scrap, reflecting a lag in both domestic and export requirements. No. 1 heavy melting and No. 1 bundles are now quoted $37-$38, No. 2 heavy melting $33-$34, and No. 2 bundles $21-$22.

● **Chicago** — Recent developments have dropped the scrap market $1 to $4 a ton. An auto stamping plant sold 9000 tons of No. 1 industrial bundles for December delivery at prices figuring about $46 a ton, delivered—a $4 drop. Further, an important mill announced $44 a ton as its buying price for December delivery. In November, its price was $46.

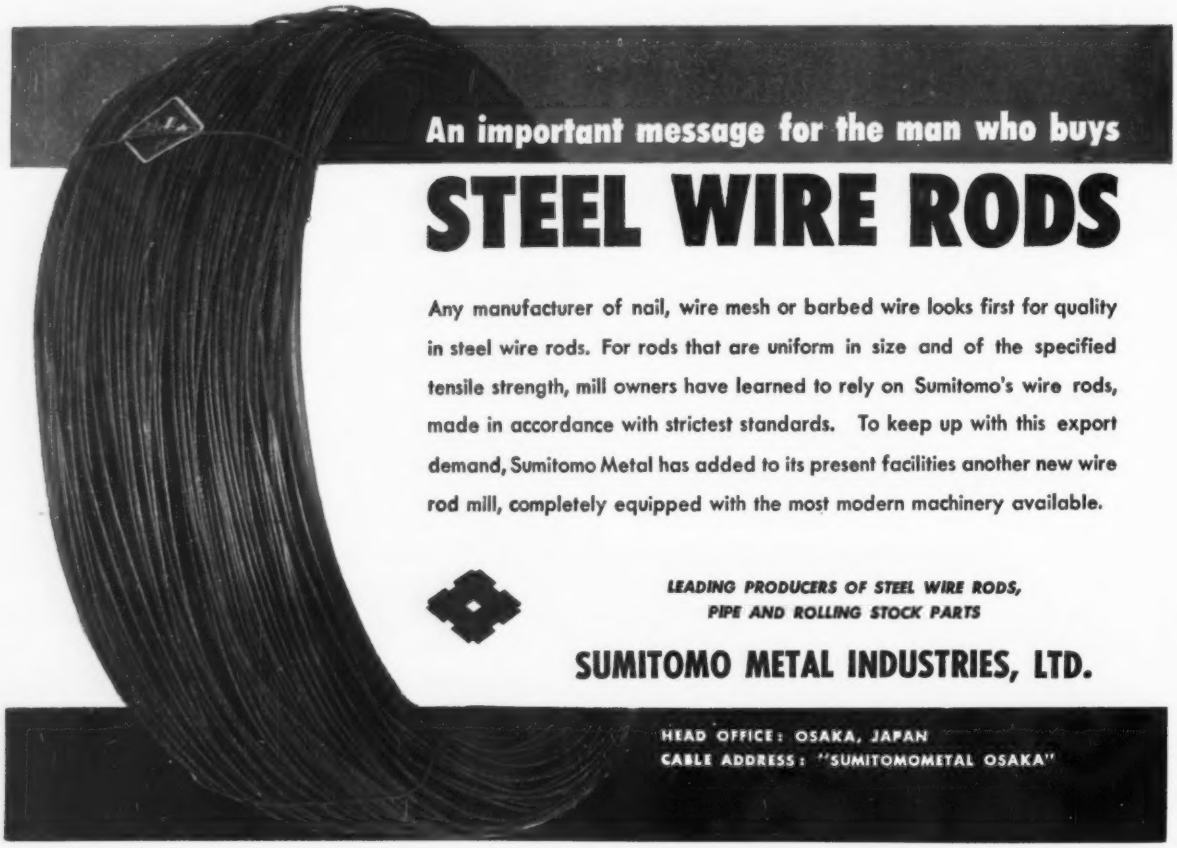
● **Pittsburgh** — The market continues its nose dive as major consumers refrain from buying. GM's Fisher Body Div. sold its factory bundles to brokers at $48, f.ob., $2 less than they brought in the previous sale. Brokers for a mill on the fringe of the district paid dealers $42 a ton delivered for No. 1 heavy melting and $38 for the No. 2 grade. Last month's prices were $46 and $41.

Straws in the wind: Increasing availability of low phos material is driving its value down. No. 2 bundles are reportedly being trucked in from the East at $26 delivered. December railroad lists will probably close $2 or $3 a ton below last month's.

● **Cleveland** — Continued absence of heavy mill buying is forcing prices down at other market points, notably Pittsburgh, and the trend is having a weakening effect on the market here and in the Valley. Quoted prices, however, are largely nominal in the absence of a representative buying test.

● **Youngstown**—A couple of small sales, the first here since the industry resumed production, were reported last week. One mill bought some No. 1 heavy melting (industrial) at $49, and another paid $47-$48 for some No. 1 heavy melting dealer material.

● **Buffalo**—Scrap is marking time pending the placing of new mill orders. The price undertone is a little easier, but some dealers think the mills will pay the quoted levels when they place new contracts.


An important message for the man who buys
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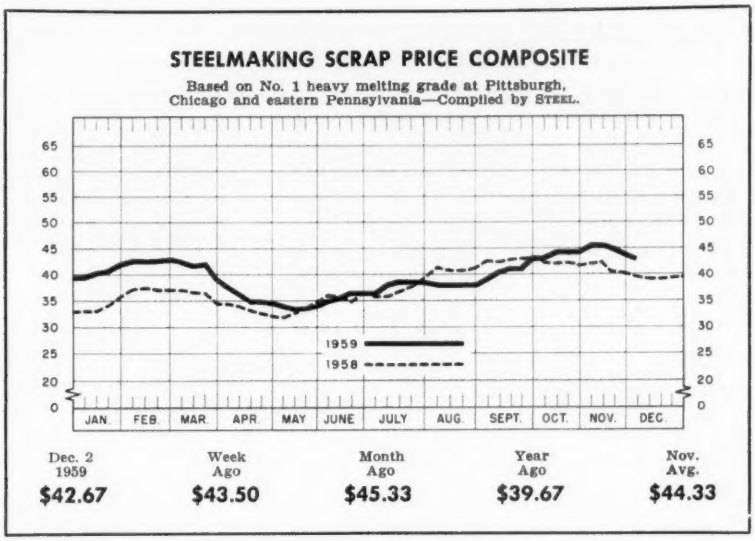

• **Detroit**—The new auto scrap lists closed $5 to $6 a ton lower than the high prices bid a month ago. Brokers, who are sitting on some orders, claim the slide is continuing and that prices will go down farther this month.

Prices are off $2 from a week ago, though the cast iron grades are holding unchanged.

• **Cincinnati**—The market is soft. Continued lack of mill buying has resulted in an easing of prices on the principal grades. No. 1 heavy melting is off $1, brokers now offering $37-$38. Another drop of $1 is predicted.

• **St. Louis**—Prices on the open hearth grades are off about $2 a ton. No. 1 cupola cast is down $1. Reason: Uncertainty over the labor outlook. The mills aren't taking in much material.

• **Birmingham** — Scrap is moving slowly here, a majority of consumers being out of the market. Some users are still receiving tonnage on old orders. Cast scrap prices are $1 lower on small sales.

• **Houston**—Inland prices declined $2 to $4 a ton on a purchase by the Lone Star mill. One broker buying for the Mexican market reduced his buying prices $2 on word that buyers south of the border will slash their offering prices on new December purchases.

Broker buying prices based on the Lone Star purchase are $40 for No. 1 heavy melting, $37 for No. 2 heavy melting, and $27 for No. 2 bundles. Scrap bought from remote areas ($4.11 freight and over) is $2 higher on No. 1 and No. 2 grades, and $1 higher on No. 2 bundles.

• **Seattle**—Market activity is limited, and prices are nominal. Larger buyers are not making future commitments. They are well supplied for the present. Yard inventories are large, and little material is being received from the country.

• **Los Angeles**—District steel mills are still reluctant to enter the market despite the sharp rise in ingot operations over the last several weeks. Despite the sluggish demand prices are holding.

• **San Francisco**—The $40 top price on steel scrap is holding, but the market is untested. There's something of a tug of war going on as some steelmakers are withholding substantial purchases at the top level, holding out for $38. Active exports are being made at $40.

Pig Iron . . .

Pig Iron Prices, Page 206

Merchant iron sellers are busy catching up with backed up orders, but they are not particularly pressed for tonnages. Furnaces which had been closed by the strike lost considerable business to those that operated throughout the shutdown. It's expected that most customers who switched to the active furnaces will resume their former trade connections. Some of them, though, may be inclined to distribute their orders more widely in the future.

Steel mills are pressing blast furnace facilities so hard for maximum output they are having trouble with units which were approaching the repair stage before the strike began. Ordinarily, mills would have kept the furnaces down for repairs, but the pressure for steel is so great

(*Please turn to Page* 217)

COVERED HOT TOP BRICK
INGOT MOLD PLUGS

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FIRE BRICK WORKS
MT. BRADDOCK, FAYETTE CO., PA.
DUNBAR, PA. BR-7-4213

QUANTITY PRODUCTION OF GREY IRON CASTINGS
ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES
ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, Dec. 2, 1959. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 2	$42.67
Nov. 25	43.50
Nov. Avg.	44.33
Dec. 1958	39.47
Dec. 1954	32.58

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*40.00-41.00*
No. 2 heavy melting	36.00-37.00
No. 1 dealer bundles	*42.00-43.00*
No. 2 bundles	*28.00-29.00*
No. 1 busheling	41.00-42.00
No. 1 factory bundles	*51.00-52.00*
Machine shop turnings	*22.00-23.00*
Mixed borings, turnings	*22.00-23.00*
Short shovel turnings	*28.00-29.00*
Cast iron borings	*28.00-29.00*
Cut structurals:	
2 ft and under	*49.00-50.00*
3 ft and under	*48.00-49.00*
Heavy turnings	*35.00-36.00*
Punchings & plate scrap	*54.00-55.00*
Electric furnace bundles	*52.00-53.00*

Cast Iron Grades

No. 1 cupola	50.00-51.00
Stove plate	46.00-47.00
Unstripped motor blocks	34.00-35.00
Clean auto cast	47.00-48.00
Drop broken machinery	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	*48.00-49.00*
Rails, 2 ft and under	67.00-68.00
Rails, 18 in. and under	68.00-69.00
Random rails	61.00-62.00
Angles, splice bars	61.00-62.00
Railroad specialties	61.00-62.00
Rails, rerolling	66.00-67.00

Stainless Steel Scrap

18-8 bundles & solids	230.00-235.00
18-8 turnings	115.00-120.00
430 bundles & solids	125.00-130.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	*43.00-44.00*
No. 1 hvy melt., dealer	*41.00-42.00*
No. 2 hvy melting	*36.00-37.00*
No. 1 factory bundles	*45.00-46.00*
No. 1 dealer bundles	*41.00-42.00*
No. 2 bundles	*26.00-28.00*
No. 1 busheling, indus.	*43.00-44.00*
No. 1 busheling, dealer	*41.00-42.00*
Machine shop turnings	*22.00-23.00*
Mixed borings, turnings	*24.00-25.00*
Shovel turnings	*25.00-26.00*
Cast iron borings	*25.00-26.00*
Cut structurals, 3 ft	*50.00-51.00*
Punchings & plate scrap	*52.00-53.00*

Cast Iron Grades

No. 1 cupola	*56.00-57.00*
Stove plate	*51.00-52.00*
Unstripped motor blocks	*48.00-49.00*
Clean auto cast	*63.00-64.00*
Drop broken machinery	*63.00-64.00*

Railroad Scrap

No. 1 R.R. heavy melt	*45.00-46.00*
R.R. malleable	*64.00-65.00*
Rails, 2 ft and under	*62.00-63.00*
Rails, 18 in. and under	*63.00-64.00*
Angles, splice bars	*55.00-56.00*
Axles	*60.00-61.00*
Rails, rerolling	64.00-65.00

Stainless Steel Scrap

18-8 bundles, solids	*220.00-225.00*
18-8 turnings	115.00-120.00
430 bundles & solids	115.00-120.00
430 turnings	55.00-60.00

YOUNGSTOWN

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	36.00-37.00
No. 1 busheling	*47.00-48.00*
No. 1 bundles	45.00-46.00
No. 2 bundles	29.00-30.00
Machine shop turnings	18.00-19.00
Short shovel turnings	23.00-24.00
Cast iron borings	23.00-24.00
Low phos.	49.00-50.00
Electric furnace bundles	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	*46.00-47.00*

CLEVELAND

No. 1 heavy melting	40.00-41.00
No. 2 heavy melting	33.00-34.00
No. 1 factory bundles	46.00-47.00
No. 1 bundles	42.00-43.00
No. 2 bundles	26.00-27.00
No. 1 busheling	*44.00-45.00*
Machine shop turnings	16.00-17.00
Short shovel turnings	22.00-23.00
Mixed borings, turnings	22.00-23.00
Cast iron borings	22.00-23.00
Cut foundry steel	45.00-46.00
Cut structurals, plate 2 ft and under	49.00-50.00
Low phos. punchings & plate	45.00-46.00
Alloy free, short shovel turnings	23.00-24.00
Electric furnace bundles	46.00-47.00

Cast Iron Grades

No. 1 cupola	55.00-56.00
Charging box cast	43.00-44.00
Heavy breakable cast	41.00-42.00
Stove plate	49.00-50.00
Unstripped motor blocks	39.00-40.00
Brake shoes	39.00-40.00
Clean auto cast	58.00-59.00
Burnt cast	47.00-48.00
Drop broken machinery	58.00-59.00

Railroad Scrap

R.R. malleable	68.00-69.00
Rails, 2 ft and under	67.00-68.00
Rails, 18 in. and under	68.00-69.00
Rails, random lengths	61.00-62.00
Cast steel	53.00-54.00
No. 1 railroad cast	58.50-59.50
Railroad specialties	59.00-60.00
Angles, splice bars	59.00-60.00
Rails, rerolling	74.00-75.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	215.00-220.00
18-8 turnings	110.00-115.00
430 clips, bundles, solids	125.00-130.00
430 turnings	45.00-55.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*35.00-38.00*
No. 2 heavy melting	*33.00-36.00*
No. 1 bundles	*44.50*
No. 2 bundles	*24.00*
No. 1 busheling	*44.50*
Machine shop turnings	20.00
Short shovel turnings	20.00

Cast Iron Grades

No. 1 cupola	*54.00*
Charging box cast	46.00
Heavy breakable cast	44.00
Unstripped motor blocks	45.00
Clean auto cast	56.00
Stove plate	44.00

Railroad Scrap

No. 1 R.R. heavy melt.	49.00
Rails, 18 in. and under	56.00
Rails, random lengths	51.00
Rails, rerolling	65.00
Angles, splice bars	50.00

BIRMINGHAM

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	32.00-33.00
No. 1 bundles	37.00-38.00
No. 2 bundles	25.00-26.00
No. 1 busheling	42.00-43.00
Cast iron borings	14.00-15.00
Machine shop turnings	25.00-26.00
Short shovel turnings	28.00-29.00
Bar crops and plate	47.00-48.00
Structurals & plates	46.00-47.00
Electric furnace bundles	42.00-43.00
Electric furnace:	
3 ft and under	41.00-42.00
2 ft and under	40.00-41.00

Cast Iron Grades

No. 1 cupola	*54.00-55.00*
Stove plate	*54.00-55.00*
Charging box cast	29.00-30.00
Unstripped motor blocks	42.00-43.00
No. 1 wheels	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	42.00-43.00
Rails, 18 in. and under	*57.00-58.00*
Rails, rerolling	61.00-62.00
Rails, random lengths	53.00-54.00
Angles, splice bars	50.00-51.00

PHILADELPHIA

No. 1 heavy melting	45.00
No. 2 heavy melting	40.00
No. 1 bundles	48.00
No. 2 bundles	29.00-30.00
No. 1 busheling	*48.00*
Electric furnace bundles	50.00
Mixed borings, turnings	21.00-22.00†
Shovel turnings	27.00
Machine shop turnings	24.00
Heavy turnings	35.00†
Structurals & plates	*51.00-52.00*
Couplers, springs, wheels	51.00
Rail crops, 2 ft & under	66.00-68.00

Cast Iron Grades

No. 1 cupola	*45.00*
Heavy breakable cast	48.00
Drop broken machinery	55.00
Malleable	68.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*33.00-34.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*21.00-22.00*
Machine shop turnings	11.00-12.00
Mixed borings, turnings	14.00-15.00
Shovel turnings	15.00-16.00
Low phos. structurals & plates	39.00-40.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	37.00-38.00

Stainless Steel

18-8 sheets, clips, solids	200.00-205.00
18-8 borings, turnings	85.00-90.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	85.00-90.00

BUFFALO

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	35.00-36.00
No. 1 bundles	39.00-40.00
No. 2 bundles	*27.00-28.00*
No. 1 busheling	39.00-40.00
Short shovel turnings	24.00-25.00
Machine shop turnings	20.00-21.00
Cast iron borings	22.00-23.00
Low phos structurals and plate, 2 ft and under	47.00-48.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.00-48.00
No. 1 machinery	51.00-52.00

Railroad Scrap

Rails, random lengths	49.00-50.00
Rails, 3 ft and under	55.00-56.00
Railroad specialties	47.00-48.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*33.00-34.00*
No. 1 bundles	*37.00-38.00*
No. 2 bundles	*27.00-28.00*
No .1 busheling	*37.00-38.00*
Machine shop turnings	21.00-22.00
Mixed borings, turnings	21.00-22.00
Short shovel turnings	24.00-25.00
Cast iron borings	23.00-24.00
Low phos. 18 in.	49.00-50.00

Cast Iron Grades

No. 1 cupola	49.00-50.00
Heavy breakable cast	44.00-45.00
Charging box cast	44.00-45.00
Drop broken machinery	59.00-60.00

Railroad Scrap

No. 1 R.R. heavy melt.	*44.00-45.00*
Rails, 18 in. and under	63.00-64.00
Rails, random lengths	55.00-56.00

HOUSTON

(Exporters' buying prices; f.a.s)

No. 1 heavy melting	39.00-40.00
No. 2 heavy melting	37.00-38.00
No. 2 bundles	26.50-27.50

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00†
No. 2 heavy melting	31.00†
No. 1 bundles	34.00
No. 2 bundles	20.00†
Machine shop turnings	17.00
Short shovel turnings	20.00
Low phos. plates & structurals	48.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Heavy breakable	35.00
Foundry malleable	43.00-44.00
Unstripped motor blocks	38.50-39.50

Railroad Scrap

No. 1 R.R. heavy melt.	38.00-39.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	25.50-26.50
No. 1 bundles	37.00-38.00
No. 1 busheling	37.00-38.00
Machine shop turnings	13.00-14.00
Short shovel turnings	15.00-16.00
No. 1 cast	39.00-40.00
Mixed cupola cast	38.00-39.00
No. 1 machinery cast	40.00-43.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*37.00-38.00*
No. 2 heavy melting	*25.00-26.00*
No. 1 bundles	*39.00-40.00*
No. 2 bundles	*23.00-24.00*
No. 1 busheling	*36.00-37.00*
Machine shop turnings	*13.00-14.00*
Mixed borings, turnings	*14.00-15.00*
Shovel turnings	*15.00-16.00*

Cast Iron Grades

No. 1 cupola	46.00-47.00
Stove plate	40.00-41.00
Heavy breakable	40.00-41.00
Unstripped motor blocks	32.00-33.00
Charging box cast	40.00-41.00
Clean auto cast	53.00-54.00

SEATTLE

No. 1 heavy melting	35.00†
No. 2 heavy melting	32.00-33.00
No. 1 bundles	25.00
No. 2 bundles	22.00†
Machine shop turnings	17.00†
Mixed borings, turnings	17.00†
Electric furnace No. 1	38.00†

Cast Iron Grades

No. 1 cupola	34.00†
Heavy breakable cast	28.00†
Unstripped motor blocks	26.00†
Stove plate (f.o.b. plant)	21.00†

LOS ANGELES

(Brokers' buying prices)

No. 1 heavy melting	40.00
No. 2 heavy melting	38.00
No. 1 bundles	39.00
No. 2 bundles	22.00
Machine shop turnings	18.00
Shovel turnings	20.00
Cast iron borings	18.00
Cut structurals and plate 1 ft and under	48.00

Cast Iron Grades

No. 1 cupola	47.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

SAN FRANCISCO

No. 1 heavy melting	40.00
No. 2 heavy melting	36.00
No. 1 bundles	36.00
No. 2 bundles	22.00
Machine shop turnings	16.00
Mixed borings, turnings	16.00
Cast iron borings	16.00
Heavy turnings	16.00
Short shovel turnings	16.00
Cut structurals, 3 ft	44.00

Cast Iron Grades

No. 1 cupola	48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

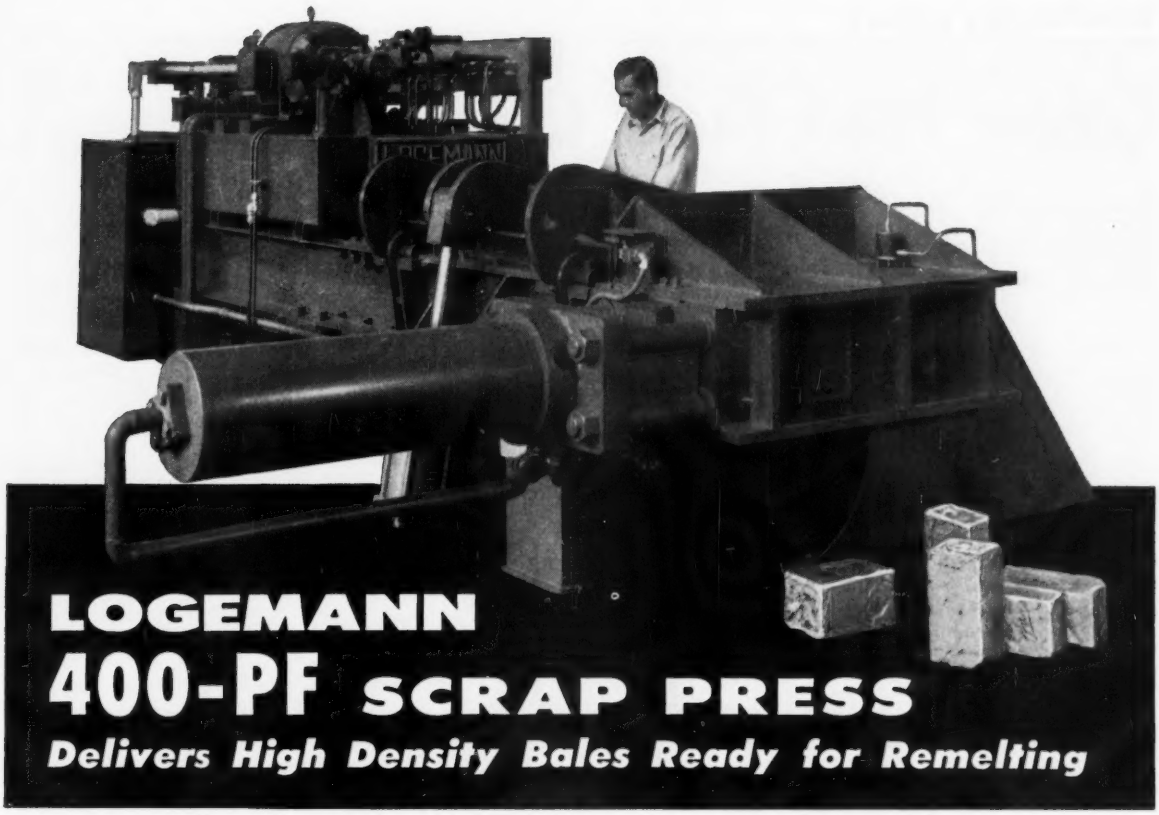
(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory:	
Prepared	32.25
Unprepared	26.25
Short steel turnings	17.00

Cast Iron Grades†

No. 1 machinery cast	46.50-48.00

*Delivered to docks.
†Nominal.
‡F.o.b. Hamilton, Ont.



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OPERATION IS ENTIRELY HYDRAULIC

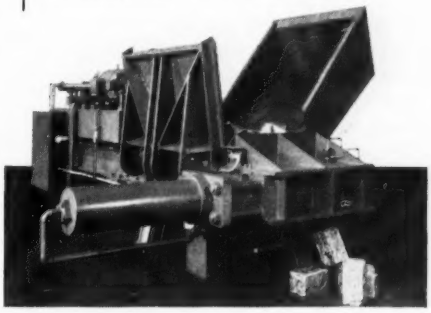
Special valves are controlled by electric switches and relays. To retain flexibility, the hopper and tamper-cover are independently controlled; pressing and bale discharge are automatic, though manual control is also available, when desired.

SPECIFICATIONS

Press-box is 72 inches long, 36 inches wide and 12 inches deep, and the loading area is 60 inches by 36 inches. Bales are 12 inches high, width can be optionally 7, 6, 5 or 4 inches, length varies depending on the character and quantity of scrap charged, which also determines the bale weights. High density is attained through use of powerful hydraulic rams.

OUTPUT

Hourly output is determined by speed of loading. Press operates at high speed; three charges can be in process simultaneously — one in the filling hopper, another on the charging plate, a third under compression.



When writing for complete details, please state the quantity and character of scrap to be baled.

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Copper Peace Draws Closer

There may be one or two holdouts, but the bulk of struck nonferrous operations will be back in production by Christmas. Still no action in aluminum talks. Lead price weak

Nonferrous Metal Prices, Pages 216 & 217

THE STRIKE that has plagued the bulk of the nation's copper operations since mid-August should be virtually over before Christmas. Look for at least 90 per cent of U. S. output of primary refined copper and a minimum of 80 to 90 per cent of mine production to be in operation by then. Most of the shut down lead mines and smelters should also be in operation within the next few weeks.

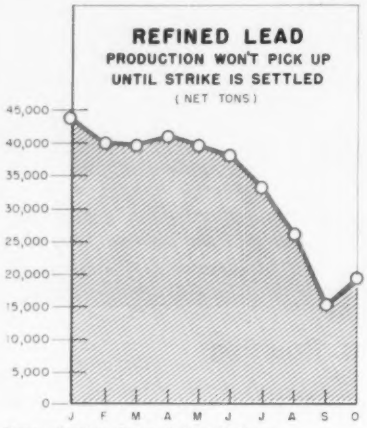
• **Pattern Emerging** — The Kaiser Steel package appears to have set the general pattern for nonferrous settlements. Kennecott Copper Corp.'s recent agreement with the United Steelworkers of America (see STEEL, Nov. 30, p. 164), calling for economic gains of 22.3 cents an hour over a 20 month period, undoubtedly was strongly influenced by the Kaiser-USW agreement.

It now looks like most other producers will offer a package that varies only moderately with Kennecott's.

Anaconda Co. is most likely to resist such a settlement. Reason: Its mining costs are thought to be the highest in the country. But it remains to be seen whether the company can hold out in the face of competitive pressures (as other producers settle).

• **Where Negotiations Stand**—Kennecott has offered an identical economic package to the International Union of Mine, Mill & Smelter Workers. Union leadership is pretty generally agreed that the economic part of the package is satisfactory, but it has balked at some of the noneconomic issues. Specifically, Kennecott wants a "no work stoppage" clause, the right to contract out for goods and services, and minor changes in certain rules and regulations. It appeared at press-time that the issues would not cause any lengthy holdup.

In another key development in nonferrous negotiations, American Smelting & Refining Co. has offered Mine-Mill a two year package set-



Source: American Bureau of Metal Statistics.

tlement at its 13 lead and copper operations. It's estimated (by the union) to be worth 22.4 cents an hour. General terms: Wage gains retroactive for July and first 20 days of August; additional health and welfare benefits to commence Jan. 1. As STEEL went to press, the only thing holding up contract approval was the settlement of local issues.

• **Significance**—Asarco accounts for around 50 per cent of refined lead in this country. Kennecott and Asarco together produced about 44 per cent of the U. S.'s primary refined copper (based on 1958 output). Kennecott's mine production is around 32 per cent.

• **Aluminum**—There's still no action in aluminum negotiations. Kaiser is evidently willing to settle immediately, but it appears the unions and other producers may not be. Once all parties make up their minds to work out a new contract, negotiations can probably be wound up pretty rapidly. Odds are the eventual wage package will be in the neighborhood of the Kennecott-USW settlement.

Markets in Brief

• **Lead**—Sales are slow, and the price is weak. The domestic price has held up because 60 to 65 per cent of U. S. smelting capacity has been out on strike. Look for an early drop in the present U. S. price of 13 cents a pound—probably by 0.5 cent to 1 cent.

• **Zinc**—Producers are shipping galvanizers a lot of metal that had previously been placed on order books, but new orders are slow. Auto business has fallen off. There probably won't be any change through December.

• **Nickel**—Business is good. Steel mills have stepped up buying, and producers look for good demand through the remainder of the year, particularly from makers of stainless and nickel alloy steels.

NONFERROUS PRICE RECORD

	Dec. 2 Price	Last Change	Previous Price	Oct. Avg	Sept. Avg	Nov., 1958 Avg
Aluminum .	24.70	Aug. 1, 1958	24.00	24.700	24.700	24.700
Copper	33.00	Nov. 12, 1959	31.50	31.278	31.500	29.415
Lead	12.80	Aug. 24, 1959	11.80	12.800	12.800	12.800
Magnesium .	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	99.625	Dec. 2, 1959	99.50	31.278	31.500	29.415
Zinc	12.50	Nov. 2, 1959	12.50-13.00	12.259	11.360	11.386

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig 99.8%, Velasco, Tex.

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STEEL
The Metalworking Weekly

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 24.70; ingots, 26.80, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 28.60; No. 43, 28.40; No. 195, 29.40; No. 214, 30.20; No. 356, 28.60; 30 or 40 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 24.50-25.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.40 per lb deld.

Cobalt: 99+ %, $1.75 per lb for 500-lb keg, $1.77 per lb for 100 lb case; $1.82 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, nom.; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, less than 1 kg, 38.30 per gram; 1-10 kg, 33.30 per gram; 10 kg or more, 31.30 per gram; intrinsic grade, 33.30-35.30 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 12.80; chemical, 12.90; corroding, 12.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb, f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75 del.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $215-217 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel, 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-100 per troy oz nom.

Palladium: $22-24 per troy oz.

Platinum: $77-80 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $122-125 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7.00 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom.; sheet, $55 per lb nom.

Tellurium: $2.50 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 99.625.

Titanium: Sponge, 99.3+ % grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+ % hydrogen reduced, $3.00-3.80.

Zinc: Prime western, 12.50; brass special, 12.75; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 13.75; special high grade, 14.00 deld. Diecasting alloy ingot No. 3, 15.75; No. 2, 16.25; No. 5, 16.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7.00 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.00-27.75; No. 12 foundry alloy (No. 2 grade), 23.75-24.00; 5% silicon alloy, 0.60 Cu max., 25.50; 13 alloy, 0.60 Cu max., 25.00; 195 alloy, 26.75-27.00; 108 alloy, 24.25-24.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 24.50; grade 2, 23.25; grade 3, 22.25; grade 4, 21.50.

Brass Ingot: Red brass, No. 115, 30.75; tin bronze, No. 225, 41.50; No. 245, 36.00; high-leaded tin bronze, No. 305, 35.25; No. 1 yellow, No. 405, 24.75; manganese bronze, No. 421, 29.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lot, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $18.50 per cwt; pipe, full coils, $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $7.25-17.00; sheared mill plate, $5.25-10.00; wire, $5.75-10.00; forging billets, $3.55-5.75; hot-rolled and forged bars, $4.25-7.50.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 26.00; ribbon zinc in coils, 21.50; plates, 20.00.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100, 3003, and 5005 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.250-0.136	42.80-47.30	.....
0.136-0.096	43.20-48.30	.....
0.126-0.103	.....	39.20-39.80
0.096-0.077	43.80-50.00	39.30-40.00
0.077-0.068	44.30-52.20	.....
0.077-0.061	.....	39.50-40.70
0.068-0.061	44.30-52.20	.....
0.061-0.048	44.90-54.40	40.10-41.80
0.048-0.038	45.40-57.10	40.60-43.20
0.038-0.030	45.70-62.00	41.00-45.70
0.030-0.024	46.20-53.70	41.30-45.70
0.024-0.019	46.90-56.80	42.40-44.10
0.019-0.017	47.70-54.10	43.00-44.70
0.017-0.015	48.60-55.00	43.80-45.50
0.015-0.014	46.60	44.80-46.50
0.014-0.012	50.80	45.50
0.012-0.011	51.00	46.70
0.011-0.0095	53.50	48.10
0.0095-0.0085	54.60	49.60
0.0085-0.0075	56.20	50.85
0.0075-0.007	57.70	52.30
0.007-0.006	59.30	53.70

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in. 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.40	47.20
5050-F	43.50	48.30
3004-F	44.50	50.20
5052-F	45.10	50.90
6061-T6	45.60	51.70
2024-T4	49.30	56.10
7075-T6*	57.60	64.70

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) across flats*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	76.90	73.90	....	....
0.250	62.00	60.20	89.10	76.60
0.375	61.20	60.00	73.50	68.50
0.500	61.20	60.00	73.50	68.50
0.625	61.20	60.00	69.80	64.20
0.750	59.70	58.40	63.60	60.40
0.875	59.70	58.40	63.60	60.40
1.000	59.70	58.40	63.60	60.40
1 125	57.30	56.10	61.50	58.30
1.250	57.30	56.10	61.50	58.30
1.530	57.30	56.10	61.50	58.30
1.500	57.30	56.10	61.50	58.30
1.625	55.00	53.60	....	56.20
1.750	55.00	53.60	60.30	56.20
1.875	55.00	53.60	....	56.20
2.000	55.00	53.60	60.30	56.20
2.125	53.50	52.10	....	....
2.250	53.50	52.10	....	56.20
2.375	53.50	52.10	....	....
2.500	53.50	52.10	....	56.20
2.625	....	50.40	....	....
2.750	51.90	50.40	....	56.20
2.875	....	50.40	....	....
3.000	51.90	50.40	....	56.20
3.125	....	50.40	....	....
3.250	....	50.40	....	....
3.375	....	50.40	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length diam., 0.375-8 in., "F" temper; 2014, 42.20-55.00; 6061, 41.60-55.00; 7075, 61.60-75.00; 7070, 66.60-80.00.

Pipe: ASA schedule 40, alloy 6063-T6 standard length, plain ends, 90,000 lb base, dollars per 100 ft. Nominal pipe sizes: ⅜ in., 18.85; 1 in., 29.75; 1¼ in., 40.30; 1½ in., 48.15; 2 in., 58.30; 4 in., 160.20; 6 in., 287.55; 8 in., 432.70.

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	42.70-44.20	51.30-55.50
12-14	42.70-44.20	52.00-56.50
15-17	42.70-44.20	53.20-58.20
18-20	43.20-44.70	55.20-60.80

MAGNESIUM

Sheets and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-75.30	90.60-91.30
36-38	66.10-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 24.75-25.25; No. 2 heavy copper and wire, 21.75-22.25; light copper, 20.25-20.75; No. 1 composition red brass, 18.50-18.75; No. 1 com-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 33.00c)		
	Sheets, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	57.13b	54.86c	....	58.32	29.000	29.000	28.250
Yellow Brass	50.57	36.06d	50.86	54.23	22.250	21.250	20.250
Low Brass, 80%	53.53	53.22	53.82	57.09	24.750	24.500	24.000
Red Brass, 85%	54.58	54.27	54.87	58.14	25.750	25.500	25.000
Com. Bronze, 90%	56.17	55.86	56.46	59.48	26.750	26.500	26.000
Manganese Bronze	58.86	52.21	62.69	....	20.875	20.625	19.875
Muntz Metal	53.20	48.26	....	....	20.875	20.625	20.125
Naval Brass	55.12	48.68	61.43	58.78	20.750	20.500	20.000
Silicon Bronze	62.86	61.80	62.15	80.79	28.375	28.125	27.375
Nickel Silver, 10%	65.98	68.06	68.06	....	26.875	26.625	14.937
Phos. Bronze	77.44	78.19	77.69	79.37	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 17.25-17.75; new brass clippings, 16.00-16.50; light brass, 12.25-12.50; heavy yellow brass, 13.25-13.75; new brass rod ends, 14.00-14.50; auto radiators, unsweated, 14.50-15.00; cocks and faucets, 15.50-16.00; brass pipe, 15.75-16.20.

Lead: Soft scrap lead, 8.50-9.00; battery plates, 4.25-4.50; linotype and stereotype, 10.00-10.50; electrotype, 8.25-8.75; mixed babbitt, 9.25-9.75.

Monel: Clippings, 30.00-32.00; old sheets, 26.00-28.00; turnings, 20.00-22.00; rods, 30.00-32.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 39.00-40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 4.25-4.75; new diecast scrap, 4.00-4.25; old diecast scrap, 2.50-2.75.

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 7.00-7.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.50-15.00; mixed high copper clips, 12.50-13.00.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.25-12.75; clean borings and turnings, 9.50-10.00; segregated low copper clips, 16.25-16.75; segregated high copper clips, 15.50-16.00; mixed low copper clips, 15.50-16.00; mixed high copper clips, 15.00-15.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.50-11.75; clean borings and turnings, 10.50-11.00; segregated low copper clips, 15.75-16.25; segregated high copper clips, 14.75-15.25; mixed low copper clips, 15.25-15.75; mixed high copper clips, 14.25-14.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, nom.; No. 2 heavy copper and wire, 26.50; light copper, 23.00; refinery brass (60% copper) dry copper content, 24.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, nom.; No. 2 heavy copper and wire, 25.50; light copper, 23.00; No. 1 composition borings, 22.50; No. 1 composition solids, 23.00; heavy yellow brass solids, 17.00; yellow brass turnings, 16.00; radiators, 18.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.40.

Copper: Flat-rolled, 50.04; oval, 48.00; 5000-10,000 lb; electrodeposited, 42.50, 2000-5000 lb lots; cast, 45.00, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 117.50; 200-499 lb, 116.00; 500-999 lb, 115.50; 1000 lb or more, 115.00.

Zinc: Balls, 19.75; flat tops, 19.75; flats, 22.50; ovals, 21.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.40 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,900 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5,900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,990 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 78.00; 100-600 lb, 68.80; 700-1900 lb, 66.00; 2000-9900 lb, 64.10; 10,000 lb or more, 62.80.

Stannous Chloride (Anhydrous): 25 lb, 153.20; 100 lb, 148.30; 400 lb, 145.90; 800-19,900 lb, 105.00; 20,000 lb or more, 98.90.

Stannous Sulphate: Less than 50 lb, 138.40; 50 lb, 108.40; 100-1900 lb, 106.40; 2000 lb or more, 104.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 211*)

they have blown in most of the units again in an effort to get extra mileage from them.

Wickwire Spencer Div., Colorado Fuel & Iron Corp., was forced to shut down one of its blast furnaces in Buffalo last week for repair and maintenance work. Other operators are running into similar trouble. If mills avoid another strike shutdown, look for closing of many blast furnaces for repair work.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 202

Reinforcing bar mills are operating full on orders that backed up during the steel strike. Little new business is developing, however, largely because of the seasonal slowing down of construction activities at many points.

Unusually large tonnage is pending in the Pacific Northwest. It involves 45,000 tons for public works and highway construction.

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Well-established corporation operating coke ovens and by-product plant in Alabama needs technically trained and experienced supervisors capable of qualifying in short time for high-level management positions. College training preferred. Submit full resume. All replies confidential. Reply Box 804, STEEL, Penton Building, Cleveland 13, Ohio.

COLD ROLLING FOREMAN for non-ferrous & stainless wire mfr. located northern New Jersey area. Send reply to Box 810, STEEL, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER in Newark, N. J. area with at least 5 yrs. experience cold rolling of stainless steels & related alloys. Send complete record to Box 812, STEEL, Penton Bldg., Cleveland 13, Ohio.

METALLURGICAL ENGINEER with at least 5 yrs. experience in wire drawing of stainless steels & related alloys needed by mfr. in northern New Jersey area. Send complete record to Box 816, STEEL, Penton Bldg., Cleveland 13, Ohio.

WIRE DRAWING FOREMAN wanted by firm manufacturing stainless steel & nonferrous wire, located Newark, N. J. area. Address reply to Box 809, STEEL, Penton Bldg., Cleveland 13, Ohio.

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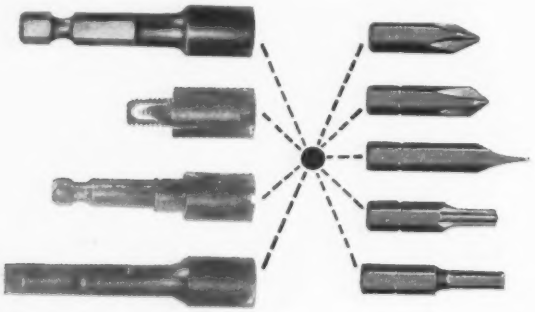
The notches in an Apex insert bit are more than mere identification. This groove—and only one is really necessary—is precisely positioned to accept the retaining ring in Apex bit holders. This original, patented Apex development prevents the bit from dropping out of the holder during the driving operation—just one more reason why your fastening costs are lower when you use Apex tools.



Apex bit holders, standard and magnetic, are available in shank types to fit all popular makes of air, electric and manual drivers. Each holder will accept a full range of insert bits to drive various types and sizes of screws. U.S. Patent No. 2,522,217; Canadian Patent No. 440,632. All part numbers original and copyrighted.

CATALOG 30-C Apex Screwdriving Tools, to drive Phillips, Frearson (Reed & Prince), Slotted, Clutch Head, Socket Head (Allen Type). Hex Head and special screws.

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Advertising Index

Acheson Colloids Co. 174
Acme-Newport Steel Co. 188
Acme Steel Co., Acme Steel Products Division 75
Aeroquip Corporation 11
Air Reduction Sales Co., A Division of Air Reduction Co., Inc. 68, 69
Ajax Electric Motor Corporation 217
Alan Wood Steel Co. 153
Allegheny Ludlum Steel Corporation 28
Allen Manufacturing Co. 160
Allied Chemical Corporation, General Chemical Division 2
Allmetal Screw Products Co., Inc. 184
Aluminium Limited Sales, Inc. 129
American Gas Association 78
American Roller Die Corporation 175
American Society for Metals, The 180
Apex Machine & Tool Co., The 218
Armco Steel Corporation 86
Atlantic Refining Co., The 25

Babcock & Wilcox Co., The, Tubular Products Division .....Inside Front Cover
Baldwin-Lima-Hamilton Corporation, Lowey-Hydropress Division 70
Bardons & Oliver, Inc. 29
Behr-Manning Co., A Division of Norton Co. 33
Bethlehem Steel Co. 1
Birdsboro Steel Foundry & Machine Co. 61
Blaw-Knox Co., Foundry & Mill Machinery Division 187
Brighton Screw & Manufacturing Co. 112
Bullard Co., The 24

Carlson, G. O., Inc. 165
Carolina Power & Light Co. 166
Carpenter Steel Co., The ..17, 18, 19, 20, 21, 22
Chambersburg Engineering Co. 53
Chemical Corporation, The 113
Chicago Rawhide Manufacturing Co., Sirvene Division 99
Chicago Tramrail Corporation 170
Cincinnati Shaper Co., The 38
Clad-Rex Division of Simoniz Co. 190
Clemson Bros., Inc. 26
Cleveland Crane & Engineering Co., The 122, 123
Colorado Fuel & Iron Corporation, The ..30, 31, 39
Commercial Shearing & Stamping Co. 3
Continental Screw Co. 46
Continental Steel Corporation 178
Cooper-Bessemer 73
Copperweld Steel Co., Ohio Seamless Tube Division 72
Copperweld Steel Co., Superior Steel Division.. 169
Crucible Steel Company of America 36, 37
Cutler-Hammer, Inc. 145

Dana Corporation, Parish Pressed Steel Division 200
De Laval Steam Turbine Co. 8
Detrex Chemical Industries, Inc. 56
Detroit Stamping Co. 171
Dodge Manufacturing Corporation 58
Dow Metal Products Co., The 196
Drave Corporation 220
Dreis & Krump Manufacturing Co. 10
Dynapak Convair, A Division of General Dynamics Corporation 65

Eastman Kodak Co., X-ray Division 133
Esso Standard Oil, Industrial Lubricants Division 110
Eureka Fire Brick Works 211

Fairbanks, Morse & Co. 124
Fairfield Manufacturing Co., Inc. 181
Fuji Iron & Steel Co., Ltd. 32
Fuller Co. 40

Gardner-Denver Co. 60
General Chemical Division, Allied Chemical Corporation 2
General Dynamics Corporation, Dynapak Convair Division 65
General Electric Co. 62, 63
General Motors Corporation, Hyatt Bearings Division 106
General Motors Corporation, New Departure Division 109
General Ore & Chemical Corporation 217
Gerlinger Carrier Co. 57
Goodyear Tire & Rubber Co., Inc., The, Industrial Products Division 4
Gould & Eberhardt Division, Norton Co. 182, 183
Greenlee Bros. & Co. 131
Gulf Oil Corporation 134, 135

Harrington & King Perforating Co., Inc., The . 197
Heresite & Chemical Co. 125
Homestead Valve Manufacturing Co. 43
Hubbell, Harvey, Inc., Machine Screw Department 16
Hyatt Bearings Division, General Motors Corporation 106

Industrial Brownhoist Corporation 71
Ingersoll-Rand 74
Inland Steel Co. 100
International Nickel Co., Inc., The 80

Jomac, Inc. 127

Kaiser Aluminum & Chemical Sales, Inc., Kaiser Refractories & Chemicals Division 162, 163
Kaiser Engineers Division of Henry J. Kaiser Co. 64
Kardong Brothers, Inc. 209
Keystone Steel & Wire Co. 59
Kinnear Manufacturing Co., The 132

Lindberg Engineering Co., Heat Treating Furnace Division 117
Link-Belt Co. 55
Loewy-Hydropress Division, Baldwin-Lima-Hamilton Corporation 70
Logemann Brothers Co. 213

McKay Machine Co. 34, 35
McLouth Steel Corporation 79

Marchant, Geo. F., Co. 166
May-Fran Engineering, Inc. 172
Metal Progress 180
Micromatic Hone Corporation 194, 195
Miller Electric Manufacturing Co., Inc. 193
Miller, Harry, Corporation 185
Missouri Rolling Mill Corporation 209
Moltrup Steel Products Co. 209
Monarch Machine Tool Co., The 14
Mundt, Charles, & Sons 219

National Acme Co., The 150, 151
National Steel Corporation 9
Nebel Machine Tool Corporation, Nebel Lathe Division 27
New Departure Division, General Motors Corporation 109
Niagara Machine & Tool Works 7
Nicholson File Co. 154
Norton Co., Behr-Manning Co. Division 33
Norton Co., Gould & Eberhardt Division 182, 183

Ohio Seamless Tube Division of Copperweld Steel Co. 72
Ohio Steel Foundry Co., The 114
Olin Mathieson, Metals Division 47

Pacific Industrial Manufacturing Co. 176, 177
Pannier Corporation, The 186
Parish Pressed Steel Division of Dana Corporation 200
Philadelphia Gear Corporation 136
Pittsburgh Steel Co. 76, 77

Ramseyer & Miller, Inc. 217
Republic Steel Corporation 12, 13
Rockford Machine Tool Co. 66, 67
Roebling's, John A., Sons Corporation, A Subsidiary of The Colorado Fuel & Iron Corporation 39
Rollway Bearing Co., Inc. 128
Roto-Finish/Ransohoff 51
Royal McBee Corporation, Data Processing Division 120
Ruemelin Mfg. Co. 184

Sandvik Steel, Inc. 50
Shenango Furnace Co., The, Centrifugally Cast Products Division 130
Signode Steel Strapping Co. 126
Simonds Gear & Mfg. Co., The 168
Simoniz Co., Clad-Rex Division 190
Square D Co. 179
Stamco, Inc. 164
Standard Pressed Steel Co., Nuclear Components Division 54
Sumitomo Metal Industries, Ltd. 210
Sun Shipbuilding & Dry Dock Co. 173
Superior Steel Division of Copperweld Steel Co. 169
Superior Tube Co. 217
Surface Combustion Corporation 102, 103
Swindell-Dressler Corporation 147

Thomas Flexible Coupling Co. 192
Torrington Co., The 85
Torrington Manufacturing Co., The 48, 49
Towmotor Corporation 57

Udylite Corporation, The 148
U. S. Electrical Motors, Inc. 167
U. S. Hoffman Machinery Corporation, Industrial Filtration Division 156, 157

Van Huffel Tube Corporation 45
Virginia Gear & Machine Corporation 136

Walsh Refractories Corporation 6
Ward Steel Co. 184
Wean Engineering Co. Inc., The .....Back Cover
Weirton Steel Co. 9
Westinghouse Electric Corporation 41, 42, 44
Wheland Co., The 211
Whirl-Air-Flow 119
Whitehead Metals, Inc. 52
Wilson, Lee, Engineering Co., Inc. .....Inside Back Cover
Wrought Washer Mfg. Co. 88

Yoder Co., The 23
Youngstown Sheet & Tube Co., The 15

~ ~ ~

Table of Contents
Facing Inside Front Cover

Classified Advertising, Page 217

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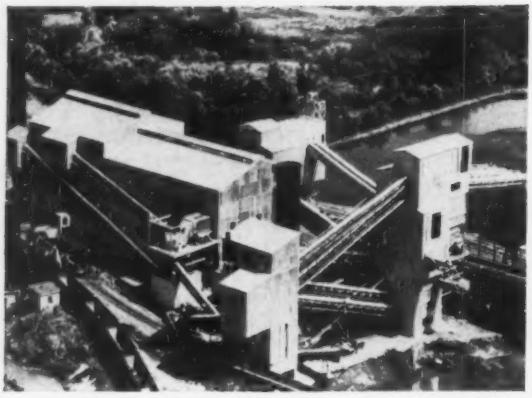

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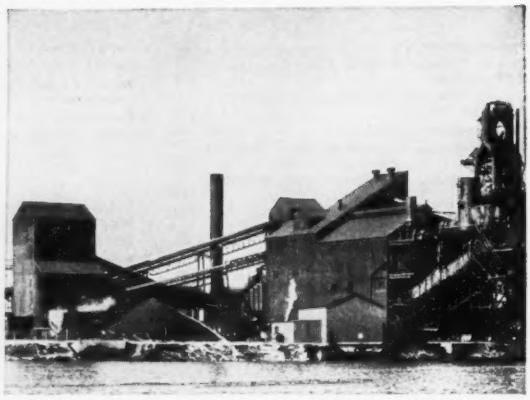

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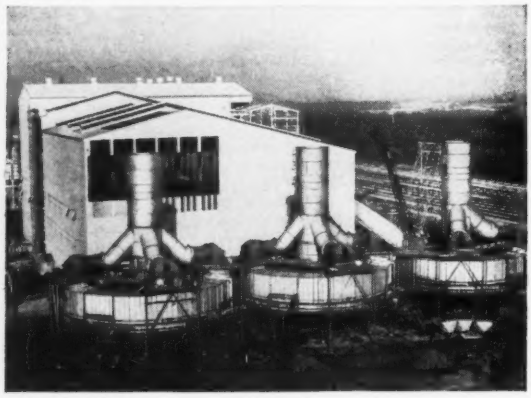

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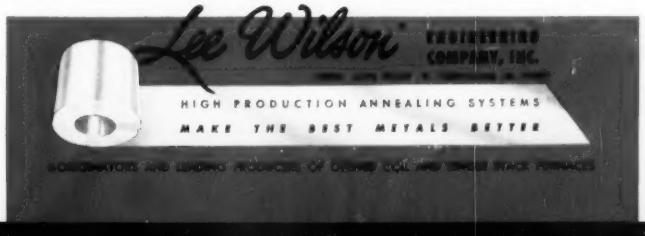

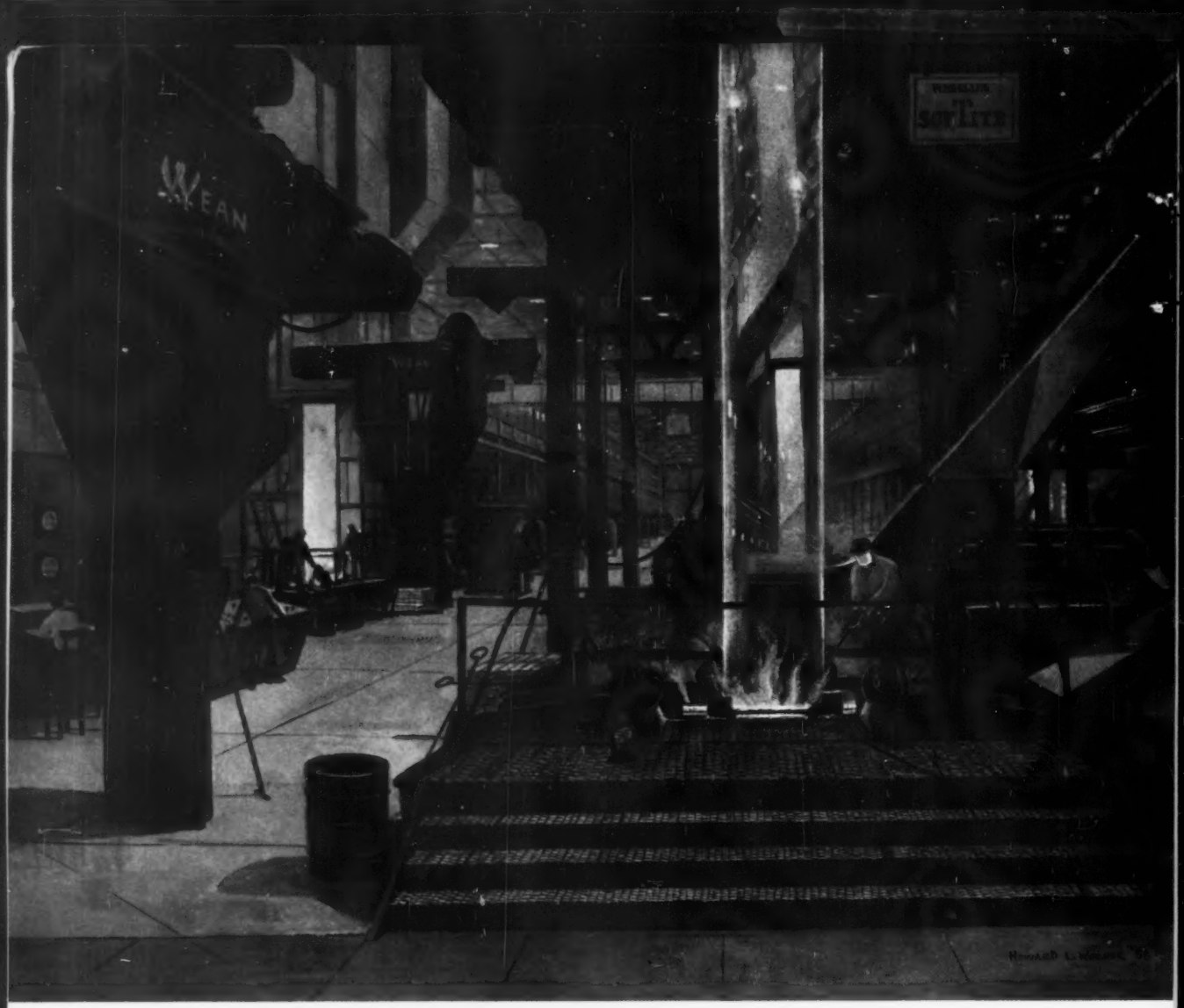

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